...Welding Engineer

OCT 14 1943

OCTOBER, 1943

...ERICA'S PIONEER TECHNICAL WELDING PUBLICATION

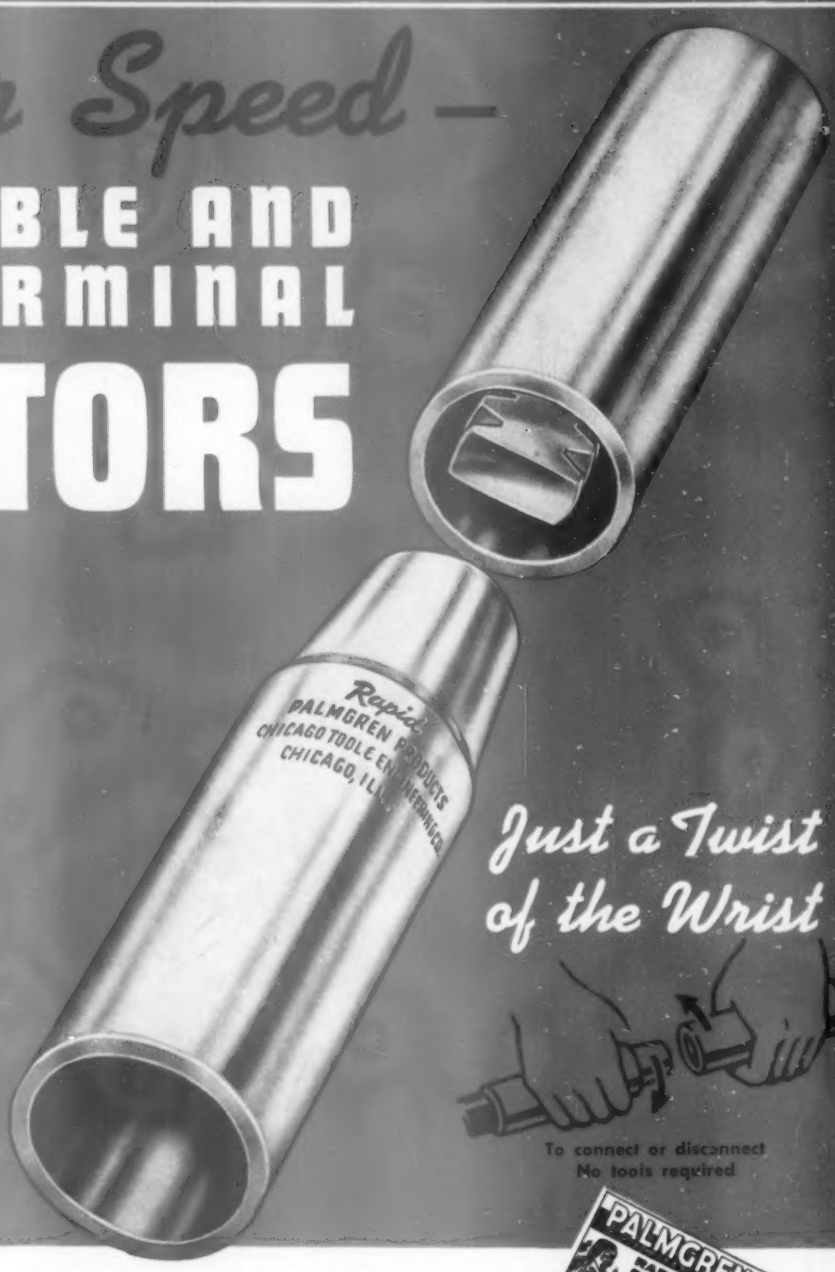
...For Greater Speed—

...ALMGREN CABLE AND ...RAPID TERMINAL

...CONNECTORS

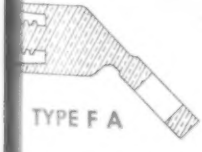
...ed up production—end needless de- ...s and make your welding quickly ac- ...sible to all jobs. It takes 3 Seconds ...look up—*Replace*—*Lengthen* or *Shorten* ...les with Palmgren Rapid Cable Con- ...tors. Screw and tapered sleeve con- ...ction assures positive contact with ...hest conductivity — It also provides ...ure locking of connections.

...mgren Rapid Cable Connectors will ...ndle 1, 1/0, 2/0, 3/0 and 4/0 cable— ...e no exposed parts—insurance against ...rting, fire hazards and damage to ...rk and are furnished with or without ...ulators.



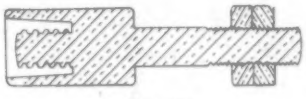
Just a Twist of the Wrist

To connect or disconnect
No tools required



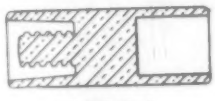
TYPE F A

...male Connector ...Angle Mounting



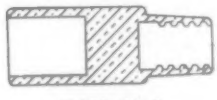
TYPE F P

Female Connector for Panel Mounting



TYPE F S

Female Half Connector



TYPE M S

Male Half Connector

Write for Free Circular A-10

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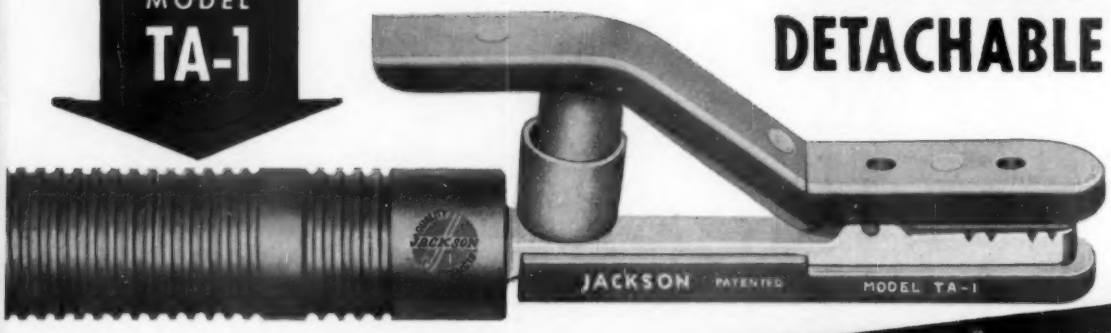
Manufacturers of PALMGREN PRODUCTS for Over 25 Years

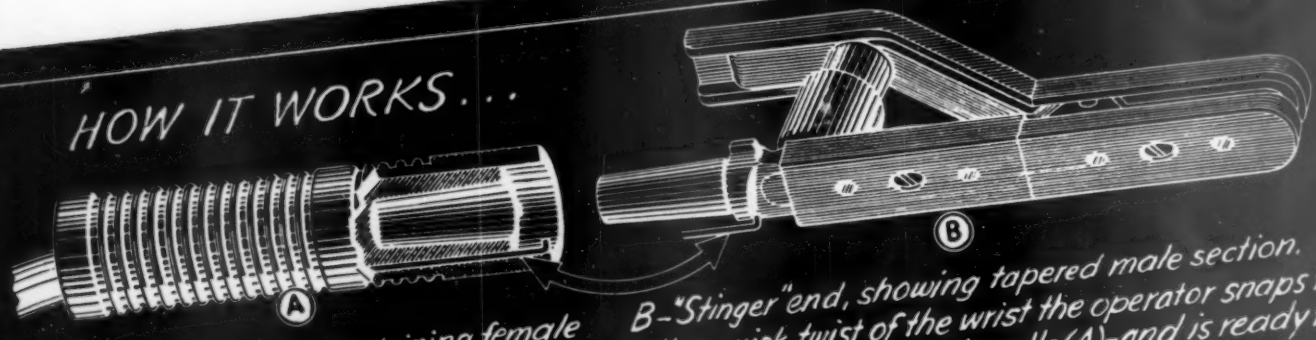
...83 SOUTH CHICAGO AVE. CHICAGO, ILLINOIS

For FASTER production welding, use Jackson's QUIK-TRIK —the holder with the DETACHABLE "Stinger"

MODEL TA-1

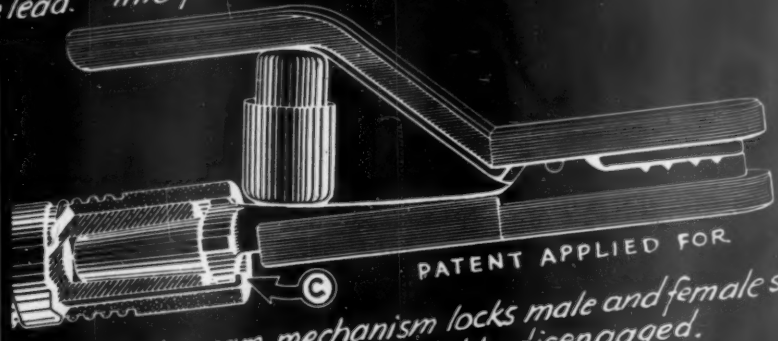


HOW IT WORKS...



A- Insulated handle, containing female section of tapered cable connector which is soldered to cable lead.

B-"Stinger" end, showing tapered male section. With a quick twist of the wrist the operator snaps this into female section in handle (A)-and is ready to go.



PATENT APPLIED FOR

C-Actuating cam mechanism locks male and female sections It locks TIGHT—is quickly disengaged.

ADVANTAGES

1. No time wasted changing cable connections.
2. No dangerous, loose cable ends exposed when "stinger" is detached.
3. Welder is responsible for his own holder (the "stinger" end—B).
4. Quik-Trik connector (handle—A) may be easily drawn through a small opening and then "stinger" may be attached. Saves time, leg work and cable extensions.
5. "Stinger" end, with quick twist, may be disengaged and turned in at end of shift for inspection. *That extends holder life!*

QUALITY JACKSON PRODUCTS

Jackson Model TA holders, *fully insulated, scientifically ventilated,* are time savers on *all* production arc-welding. Model TA-1 (illustrated above) is a 300-Amp. job, taking rods up to ¼ in. • Model TA-3 is a 500-Amp. holder taking rods as heavy as ⅜ in. Study the drawings, consider the advantages. • Contact your Jackson dealer

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The Welding Engineer

Vol. XXVIII, No. 10 OCTOBER, 1943

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"YOU CAN LEAD A HORSE TO WATER"—

Stubborn, some horses. But intelligent, too!

That's why we say the fellow who really uses the brain he was born with . . . has "horse sense."

We think many of our customers, who know that welding is a *metallurgical problem,* show that kind of judgment by insisting on McKay Shielded-Arc Welding Electrodes. Because the solution to metallurgical problems starts in the laboratory . . . with microscopes and test tubes and painstaking analyses. McKay Electrodes come from the "researched line" . . . the only line, to our knowledge, developed in a great nationally known research institute.

And men who specify McKay Commercial Chain (and McKay Tire Chains for their automobiles, too) show good judgment in buying the product evolved over 60 years of manufacture since the days when chain was sweated out over a simple blacksmith's forge.

We like "horse sense."

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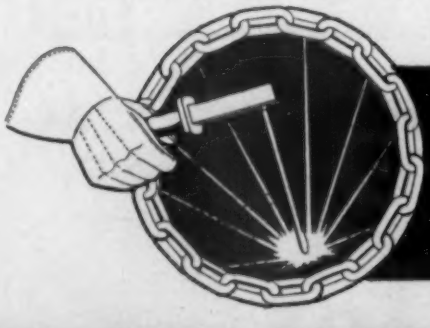


PITTSBURGH, PA.

WELDING ELECTRODES . . . COMMERCIAL CHAINS . . . TIRE CHAINS

The Welding Engineer

AMERICA'S PIONEER WELDING JOURNAL

Established 1916

In Days to Come

Postwar plans are springing up thick and fast. When peace comes, however, most of the inspirational ideas are likely to be forgotten in a mad scramble for business. This will be as true of the welding field as of other fields.

The big problem will be that of getting business. No longer will there be a sellers' market with dozens of buyers at hand for every item that can be manufactured. Sales will be made by "beating the bushes." In this respect, it might be well to think of the bush-beating days to come.

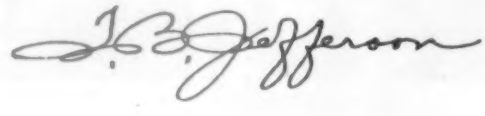
Manufacturers will be looking to their jobbers to actively sell their lines. Right now, however, some of these manufacturers are actually competing with their jobbers. The jobber develops sales through hard work and expense; then, as he begins to reap the reward for his efforts, the manufacturer steps in and sells direct. A rather bitter pill to swallow—and a shortsighted policy which will *not* make a jobber continue to work hard to continue to push that particular line of merchandise.

The manufacturer, however, is not the only sinner. Sinners will be found among the jobbers, too—jobbers who have become "manufacturers" and promote their own private brands, forgetting their obligations to those they represent as distributors. Yes, private brands are selling in these days, but how will they continue to sell when nationally advertised products are again available?

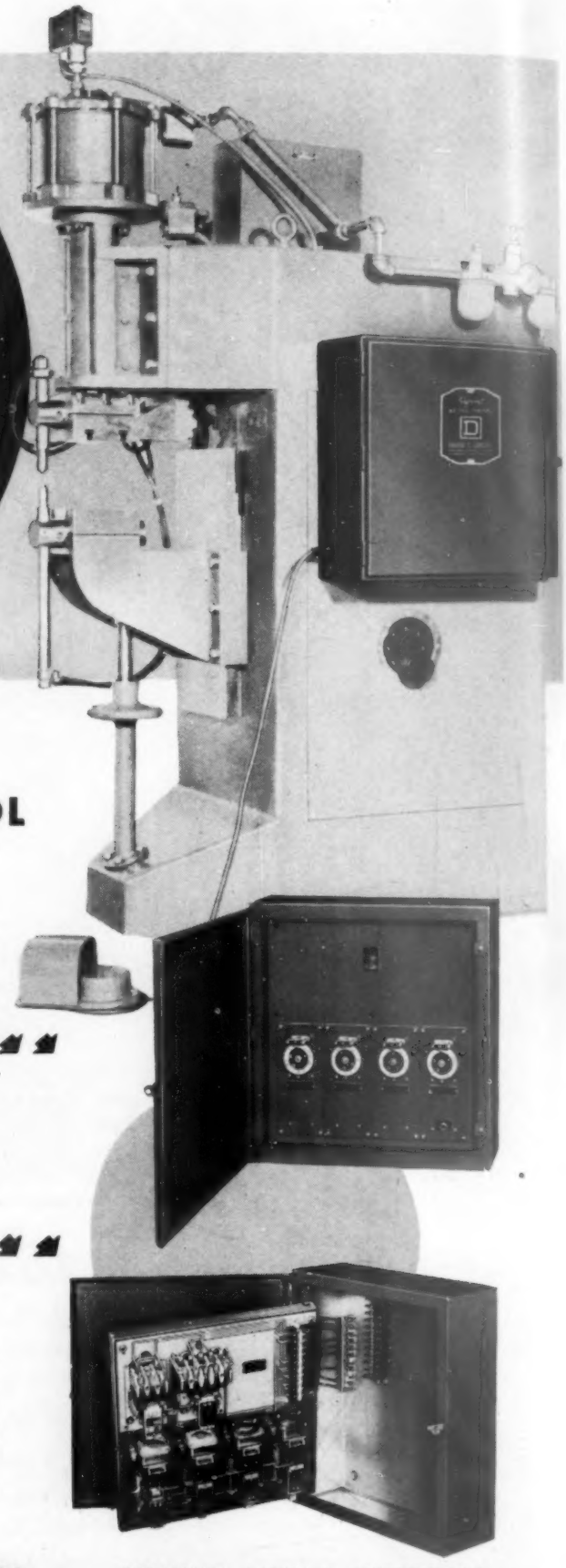
Another difficulty which will confront some jobbers in the postwar era will be that of keeping their expanded organizations operating. When the struggle for business begins, the jobber with many branches (and thin management) may find his lot much more severe than that of the jobber who is concentrating his sales effort in his normal wholesale area.

The welding industry is fortunate in that it is troubled with very few such offenders against wise business practice. While there is time, however, it might be well for those in the industry to stop and reconsider their distributor problems in the postwar period. Without question, jobbers will play an important part in "beating the bushes" after the war.

Welding is "big business" today, and it will continue to be big business after the war. There should be enough business for us all, if we do not get too greedy. So let us keep greed down by keeping alive a cooperative spirit between welding jobbers and manufacturers.



SIMPLICITY *and* ACCESSIBILITY



Outstanding Features of *Safront* WELDER CONTROL

SIMPLICITY! Only simple magnetic relays and pneumatic timing units are used in the assembly of Safront Weld and Sequence Timers. Circuits are conventional—easy for the electrician to understand and service. Individual pneumatic timing relays govern each step in the resistance welding cycle. Operation is based on the interval required to transfer a small volume of filtered air from one chamber to another, through a regulated orifice.

ACCESSIBILITY! Loosening two screws permits swing-out of the Safront timer panel. Control relays, timing relays, terminals and wiring are instantly accessible for inspection or maintenance. Coils, contacts and all renewable parts may be replaced, in a matter of seconds, using only a screwdriver and pliers.

★ ★ ★

Standard types of Safront timers are available to meet practically all resistance welding requirements. Safront construction places all electrically "live" parts behind a protective panel, yet provides large calibrated dials with knurled adjusting wheels in front, for finger-tip adjustment of individual timing periods.

Write for Bulletin 8991

ELECTRICAL EQUIPMENT • KOLLSMAN AIRCRAFT INSTRUMENTS

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

Welded planes and welded ships are working together to bring victory after victory to United Nations.

Official U. S. Navy Photograph

Welding at War!

By **T. B. JEFFERSON** *and* **CLYDE B. CLASON**

WELDING is an important part of the war. On the pages which follow are pictured a few examples of the various ways in which welding is being used to make superior weapons for the fighting front. These pictures, however, tell only a small part of the story.

Welding and flame-cutting and allied processes are making it possible for allied armies to win. The application of welding began even at Pearl Harbor; it was welded repairs that made it possible for many craft to return to sea months before they could have been finished by other methods.

Welding made the tools to make war products. In many instances, plants now engaged in the manufacture of great quantities of war materials were put up in corn fields within a few months by the use of welded construction. Machine tools used in these plants were also fabricated by welding.

Planes, tanks, ships are welded. And many, many other war products!

Few—very few outside of this industry—realize the full significance of welding in the production of war materiel. Examples of applications in which the finished product is but rarely associated with welding are to be found in radar equipment, electronic tubes, shell cases, ammunition, "block buster" bombs, projectiles, torpedoes, land mines, machine guns, smoke bombs, oxygen tanks and many other items. Perhaps little welding is involved—only a spot weld or a spot of weld metal—but the welding operation is, nevertheless, indispensable.

Nor should the production of weapons of destruction — all kinds and types—be construed as the only use of welding in time of war. Those using welding for the maintenance and repair of war equipment know how much of our war effort depends upon the ingenuity of Seabees and Army weldors. Their counterparts in civilian life are job shop weldors. Inasmucl. as war demands have restricted the production of even repair parts for civilian goods, much of the present civilian economy would be utterly impossible without welding.

Welding is being used for the salvage of equipment—civilian and military—that would otherwise have to be relegated to the scrap heap.

Some day the war will end. And in the postwar era, welding will contribute much towards making the world of that perhaps not-so-distant future a better place in which to live.

For the Air War . . .

Courtesy, The Dow Chemical Co.

Welding a magnesium alloy rudder tip. Inflammable magnesium can be arc welded without difficulty by using a helium shroud.

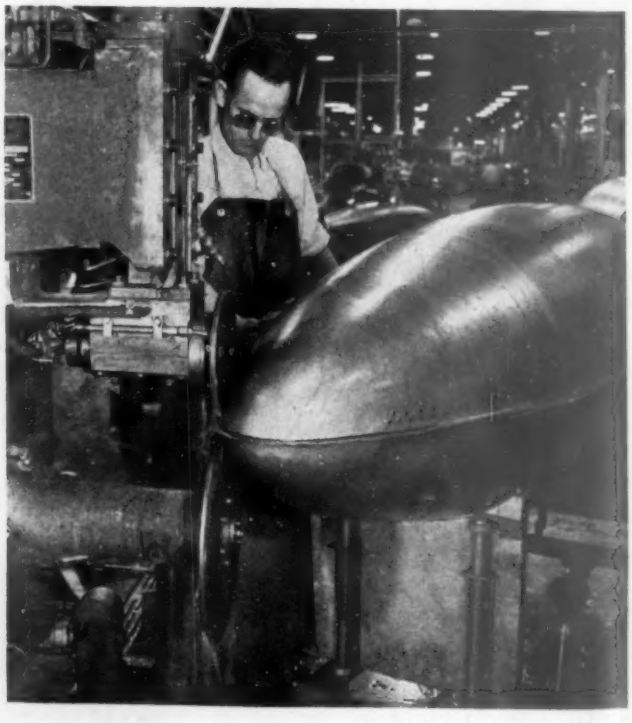
Courtesy, The Lincoln Electric Co.

Special jigs are of great importance in aircraft welding. This one is being used to arc weld a motor mount ring of thin-walled chrome-moly tubing (X-4130) to forged lugs.

●

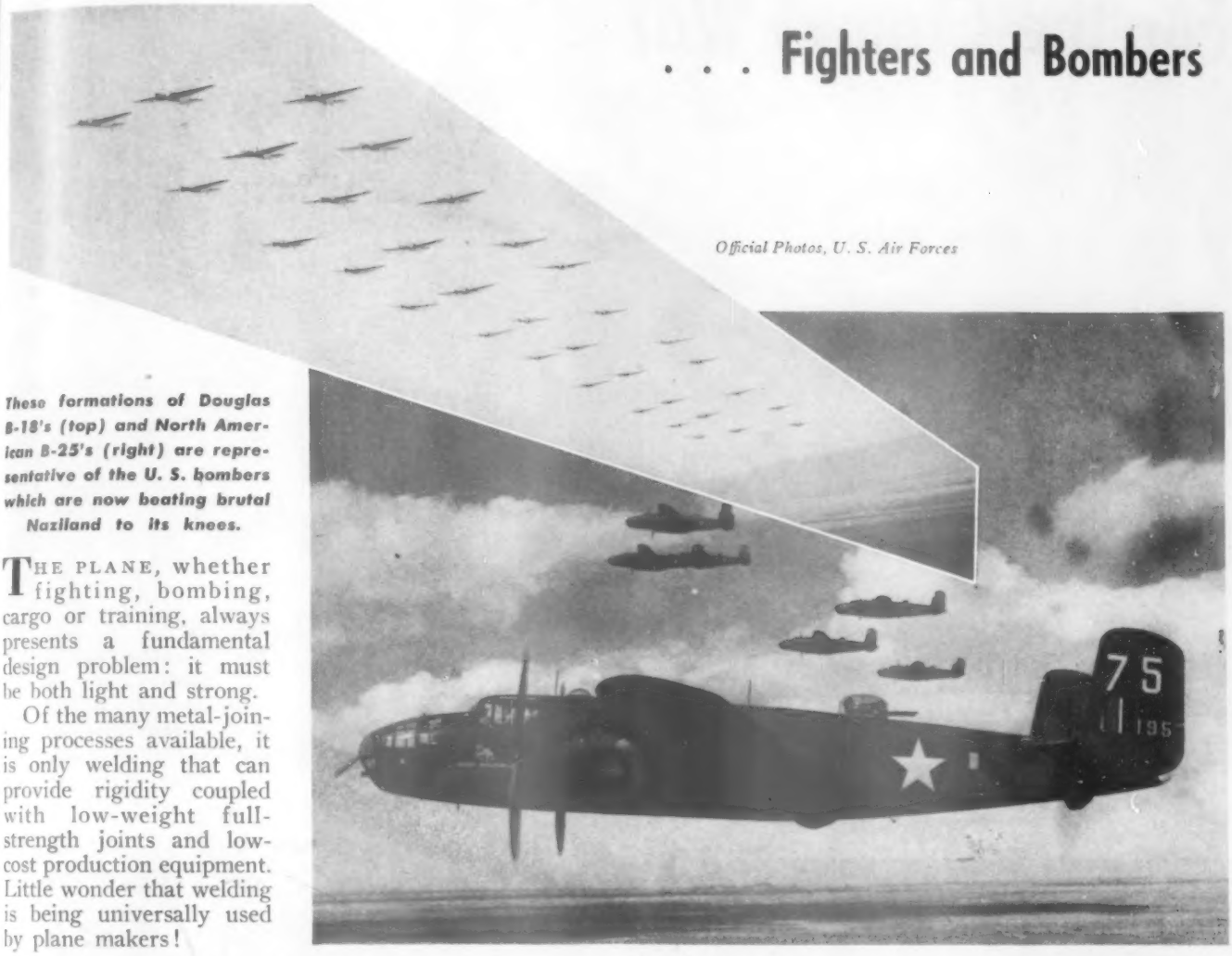
Below: Quantity production of aircraft at anything like the present output would not be possible without the extensive use of resistance welding. Two applications of this versatile welding process are shown in the two bottom pictures. On the left, the nose end of a fuselage is being spot welded at Douglas Aircraft. On the right, the two halves of a streamlined releasable gasoline tank are being seam welded together at a rate of 60 in. a minute.

Courtesy, Sciaky Brothers



Courtesy, Lockheed Aircraft Corp.

. . . Fighters and Bombers



Official Photos, U. S. Air Forces

These formations of Douglas B-18's (top) and North American B-25's (right) are representative of the U. S. bombers which are now beating brutal Nazi land to its knees.

THE PLANE, whether fighting, bombing, cargo or training, always presents a fundamental design problem: it must be both light and strong.

Of the many metal-joining processes available, it is only welding that can provide rigidity coupled with low-weight full-strength joints and low-cost production equipment. Little wonder that welding is being universally used by plane makers!

Courtesy, Sciaky Brothers

Left: With "brains built into the machine," resistance welders may be readily operated by women and other unskilled workers. This young lady is doing her part in the war effort by spot welding cowling on a Bell Airacobra.

Right: Throughout the aircraft industry, the oxy-acetylene torch is widely used for welding thin sheet stock. Skilled gas weldors are, of course, essential. This operator is welding a sand-cast fitting to a tank for holding de-icing fluid.

Courtesy, The Dow Chemical Co.

For the Ground War . . .

WELDING's biggest contribution to the war is, perhaps, the use of modified stainless steel welding electrodes for the joining of armor plate — a development making possible the welded tank. Much of the success of the North African campaign can be attributed to the welded M-4 tank and the welded M-7 and M-10 tank destroyers with their heavier firepower.

Welding did many things for the military tank. Most important of

Battleship of the land! The all-welded hull of this massive M-4 tank holds armament that insures a tremendous concentration of firepower.

Official OWI photo by Palmer

American Locomotive Co. Photo

Below: [illegible] half-trac [illegible] coördination activities. Lacking the striking power of the tank, the half-trac is swifter and more flexible. A welded roller (in place of front bumper) aids it to negotiate terrain that is insurmountable to the ordinary motor vehicle. ***See also page 43.***

Official OWI Photo

Above: Tank buster! The camera caught this M-7 tank killer rumbling peacefully through the traffic-laden streets of New York City on its way to a public exhibition sponsored by Mayor LaGuardia. The M-7 is a speedy, highly maneuverable land cruiser that has already caused lots of grief to Nazi armored divisions.

these was the removal of the hazard of ricocheting rivet heads. When enemy shells hit one of our earlier riveted tanks, the resulting explosion would fill the tank interior with flying rivet heads—the worst kind of shrapnel.

The tank destroyer is a true example of the flexibility of welding—from an idea to the finished product in five days. It is difficult to see any other method of joining metals which would permit this feat.

Rommel's Afrika Korps couldn't take the fire of our newly designed M-10 tank destroyer. Notice how the hull and turret are sloped to deflect enemy shells.

Photos, courtesy Fisher Body Div. of General Motors

Two welders—one at the top and one at the bottom—make each turret of the new M-10 tank destroyer an almost impregnable fortress. A special large-capacity positioner is used to facilitate welding.

Automatic welding plays an important part in the production of both the M-4 tank and the M-10 tank destroyer. This picture shows an assembly for the latter being welded by the submerged melt process.

For the Sea War . . .

U. S. Maritime Commission Photo

Troop transports such as the USS General Goethals (right) are vital to the invasion of Hitler's "Fortress of Europe." Welding enables such ships to be produced at rates that would have seemed incredible to shipbuilders of World War 1.

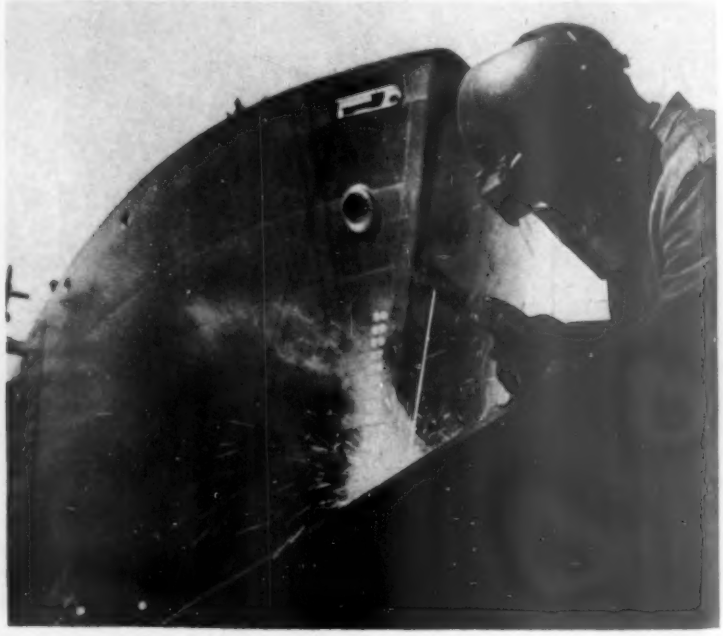
Official U. S. Navy Photograph

Miss Betty L. Sayce is one of the thousands of women who are now working in shipyards to help bring the war to a successful close. The photographer found her welding straps between two full sections of a ship at the Puget Sound Navy Yard.

WELDING is making it possible for ships to get to sea quicker than ever before. During World War I, the fastest average building time during any one month was 225.8 days. In June, 1943, the fastest average building time was 27.8 days for the welded Liberty ship. Five ships a day, averaging over 10,000 tons each, were launched in the same month.

War ships, too, are welded, and for that we can thank the Naval Limitation treaties of Versailles and Washington. Confronted with the task of designing efficient fighting vessels with capacities not exceeding 10,000 tons, naval designers turned to the greater use of welding. Weight which had heretofore been in rivet heads and lap joints—8% to 12% of the ship's total weight—was thus made available for other purposes: armaments, protection and speed.

Below: The man with the arc represents one very good reason why American shipyards are turning out merchant vessels much faster than Nazi subs can sink them. About 80% of ship fabrication formerly handled by riveters is now being done by arc welders.



U. S. Maritime Commission Photo

. . . Battle Wagons and Transports

Official U. S. Navy Photograph

In all its 168-year history, the U. S. Navy has never been a stronger fighting force than it is right now. Such battle wagons as the New Mexico and the Mississippi would bring joy to the gallant spirit of John Paul Jones.

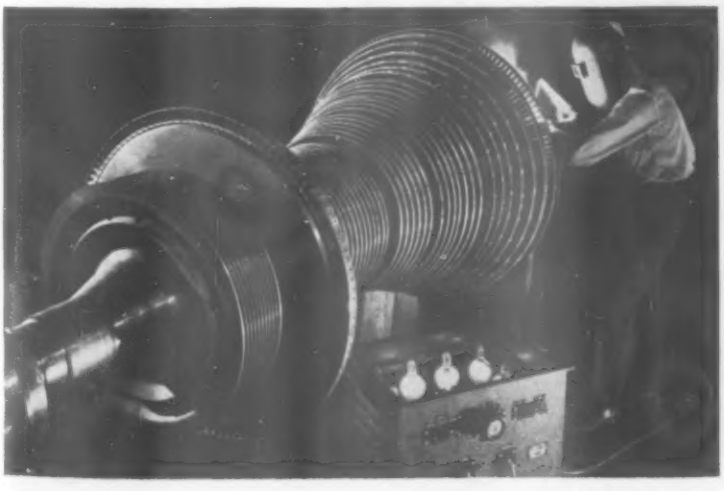
U. S. Maritime Commission Photo

Shipbuilders' sewing machine. Forty hand welders could not do the work of this automatic welder, which joins frames and hull plates into huge prefabricated sections to be assembled at the shipways.

U. S. Maritime Commission Photo

Can welded ships take punishment? Well, one of them, the SS William Moultrie, reached her destination without a leak even though she had been blown clear out of the water when a fellow ship carrying explosives was bombed nearby. Working more than 75 ft above the ground at Ingalls Shipyards, these men are welding thick steel slabs instead of riveting them in the old, slow way.

Below: Thin-gauge metal such as marine steam turbine blades may be successfully welded with the low amperage electronic arc welder.



Courtesy, Allis-Chalmers Mfg. Co.

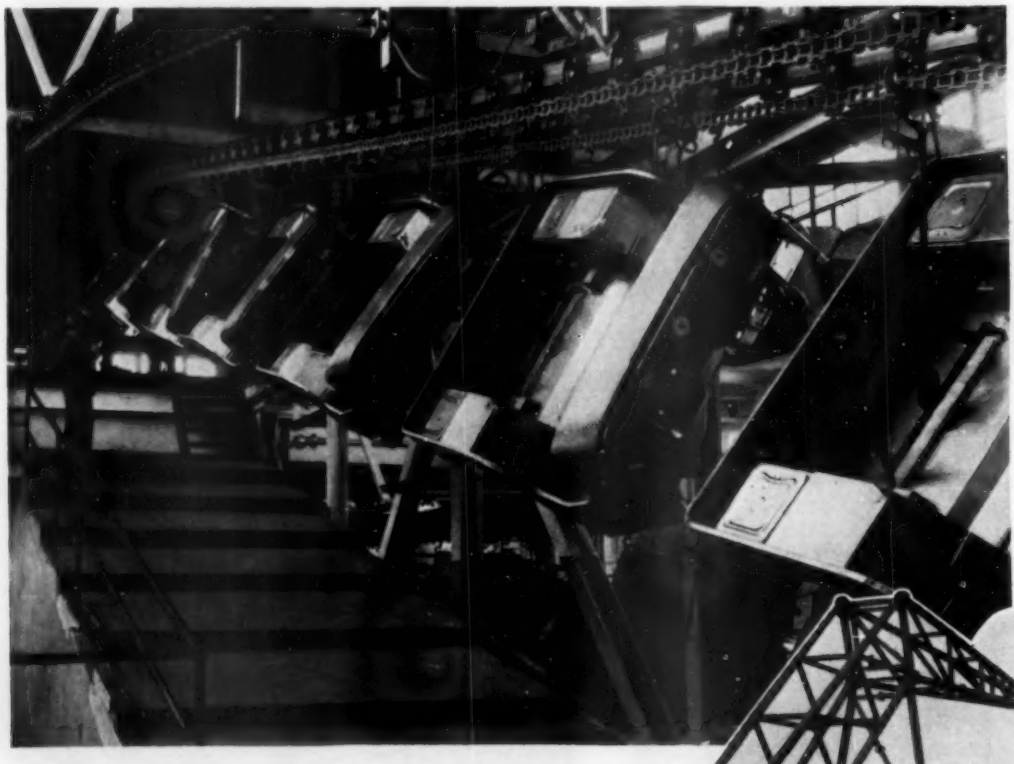
For Mobile Warfare . . .

Courtesy, The White Motor Co.

The U. S. Army "Prime Mover," a six ton, six wheel truck built to transport men and war materials and to tow heavy guns. It drives on all six wheels.

IMPLEMENTS for the mobile war are mostly products of automotive, truck and tractor plants. These plants learned long ago, in times of peace, of the advantages of welded construction. Welding meant speed, and speed has always played an important part in an assembly line production program.

When it came to producing equipment for moving the Army, the experience gained from peacetime practices was easily applied to the principles of wartime construction. A welded structure is homogeneous and thus has the strength necessary to stand the stresses and strains encountered by scout and reconnaissance vehicles as they crash ahead in and out of ditches, shell holes and other obstacles on the fighting front.



Left: One immediately behind another, all-welded jeeps are rolling off the assembly line continuously at this Ford Motor Company plant. Operators with welding guns are stationed at various points along the conveyor line in order to assemble the jeep bodies by spot welding.

Right: Meet "Paul Bunyan," otherwise known as the "B-30 Tournacrane." Even the legendary Paul Bunyan and his blue ox would have difficulty in keeping up with this giant mobile crane, which can pick up an A-29 bomber like a child's toy and hustle it on or off the air field. Paul's namesake is capable of lifting loads up to 35 tons.

Courtesy, R. G. LeTourneau, Inc.

. . . Jeeps, Trucks and Locomotives

Since soldiers must be moved in trains, it is not surprising to find that the U. S. Army is obtaining these "Austerity" type locomotives for service in foreign lands.

Courtesy, The Baldwin Locomotive Works

Automatic arc welding is used to weld bearings for the all-welded roller at the front of half-tracs and scout cars. The roller is of great aid when ditches must be traversed.

Scout cars (above) and half-tracs being built by The White Motor Co. for the U. S. Army Ordnance Department. Used mainly for reconnaissance work ahead of the fighting forces, the scout cars are speedy vehicles driving on all four wheels. The half-tracs are also used in reconnaissance work and as personnel carriers. They can negotiate soft and broken ground and ford streams up to a depth of 2½ feet. Both of these vehicles are armor-plated to protect their crews and are equipped with machine guns. The bottom left picture shows manual arc welding of a pin in a bogie arm. This arm-and-pin assembly will become a part of the track system on a half-trac.

Guns Big and Little . . .

Official U. S. Navy Photograph

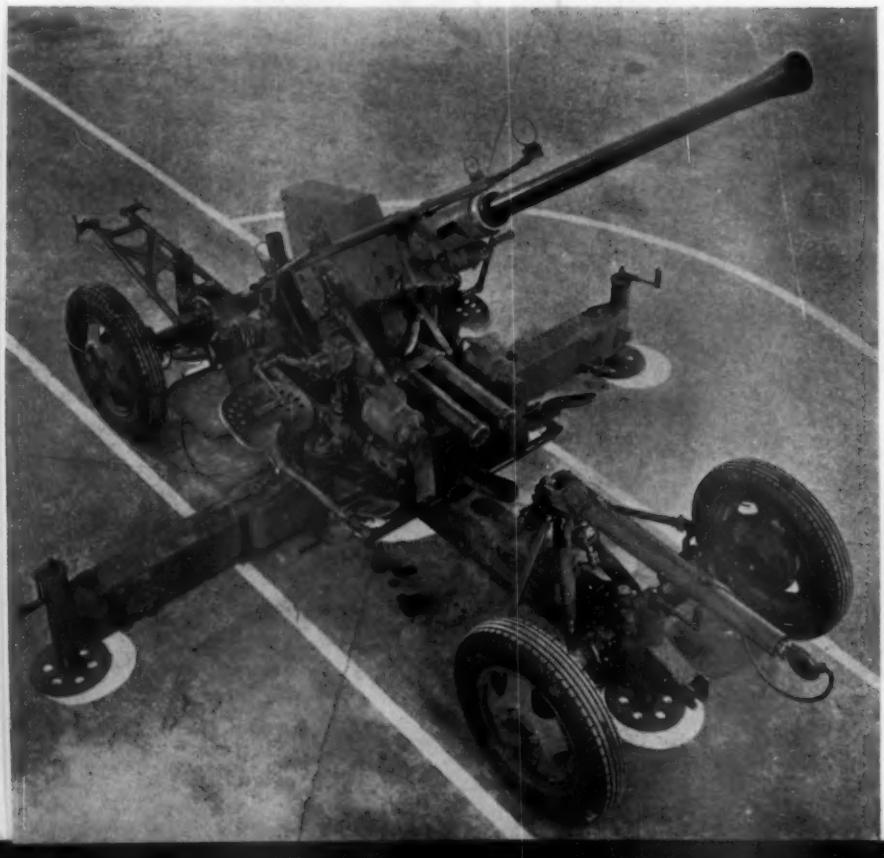
Guns for American merchantmen! Piracy on the Spanish Main has paled into insignificance besides the piracy of Hitler's U-boats. Hence the presence of Navy gun crews such as this one to insure that America's lifeline of shipping can continue unchallenged.

American Locomotive Co. Photo

Mass production on 105 mm gun mounts for the Army's new M-7 tank destroyer (see page 38). Note the welded recoil ways.

GUNS, whether 30 caliber rifles or 16 in. coast defense guns, depend upon welding for their efficiency. Probably the most striking examples of this are found in the mobile field pieces—huge guns which must be sufficiently light to be towed by "prime movers" yet sufficiently strong to withstand the rigors of war.

For firing accuracy, the rigidity of the gun carriage must be maintained during travel, and to obtain this necessary rigidity welding is superior to all other metal-joining processes. An excellent example is provided by the riveted gun carriage of the Swedish Bofors automatic anti-aircraft gun, which was redesigned for the use of welding. The welded gun carriage is 55% stronger than the riveted carriage but only 25% heavier. A 20% reduction in the man-hours of labor needed to produce the carriage was also effected through the use of welding.



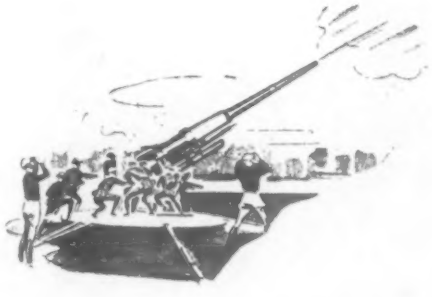
Courtesy, The Lincoln Electric Co.

Portable 40 mm anti-aircraft gun in firing position. The Swedish Bofors anti-aircraft gun was thought to be as good as could be devised to protect field troops against low-flying aircraft, but American ingenuity improved it with an all-welded carriage which was stronger, cost less and could be produced in a shorter time.

. . . For Fighting on All Fronts

Official U. S. Navy Photograph

One example of the many ways in which welding is speeding the conversion of merchantmen to deadly sea fighters. This machine gun nest is being welded to the superstructure of a once wholly peaceful merchant vessel.

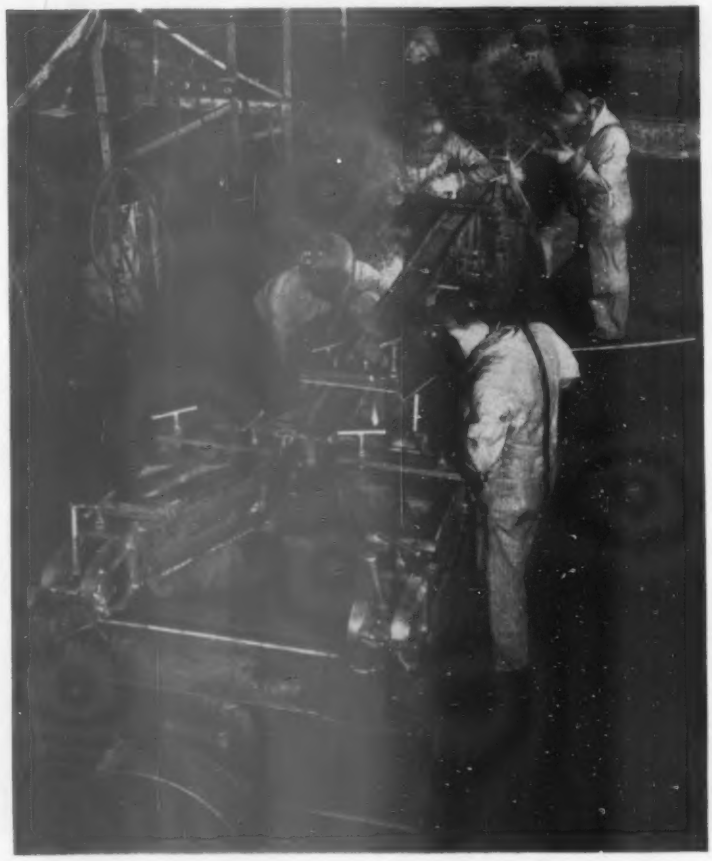


Courtesy, Fisher Body Div. of General Motors

Welding the trail or tongue of an anti-aircraft gun is no small job, for literally hundreds of feet of welding are required for each one of these sections. The four men who are engaged in this exacting work deserve special mention: all of them were automobile workmen only a comparatively short while ago and only one of the four had had previous welding experience (oxy-acetylene exclusively.)

Courtesy, Cullen-Friestedt Co.

Welding a 155 mm (Long Tom) field gun mount. A three ton positioner permits continuous downhand welding of the bulky weldment.



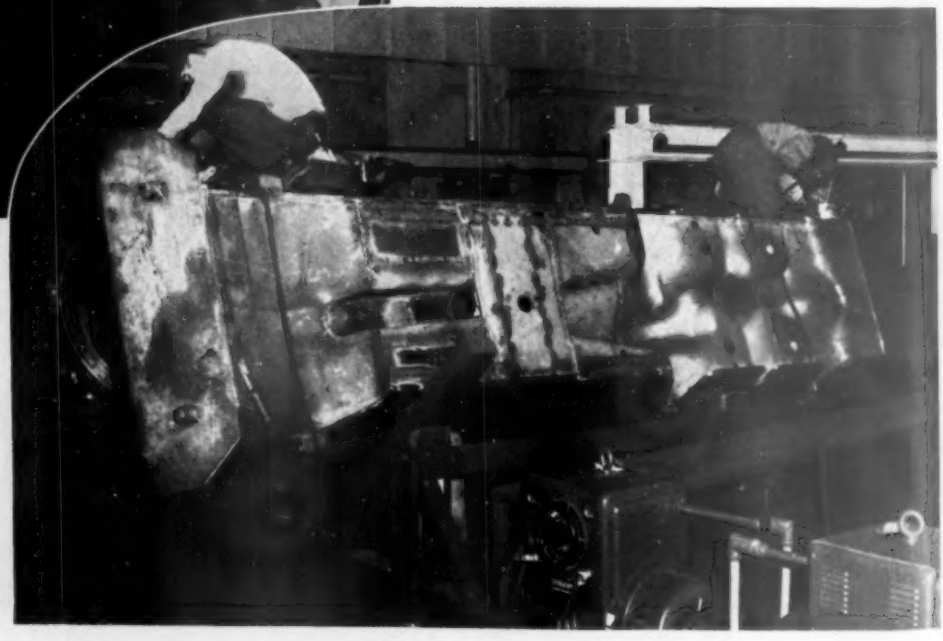
Amphibians for

From Ford News Bureau

Arc, spot and seam welding unite to render watertight the welded hull of the amphibian jeep—those craft at home on the land or sea.

Courtesy, Shilsaw, Inc.

Above: A portable disc sander is used to speed the cleaning of welded seams on amphibians.



Right: Many problems are involved in the welding of amphibian hulls. Note fixture holding the weldment.

From Ford News Bureau

WELDING is continually aiding our amphibious forces. It is welding which makes the amphibian jeep watertight, welding which provides the flexibility required for landing barges and invasion boats, welding which gives ruggedness to the tractors, bulldozers and power shovels that aid in clearing the way for invasion forces.

The lightweight welded pipe with its quick couplings readily provides a means of transporting gasoline and other liquid supplies to aid invading forces. A 4 in. welded pipe line is capable of transporting 5,000 bbl of gasoline a day.

Welding in the field also serves as a means of aiding our invasion forces. Landing mats may be quickly joined by welding to provide air-borne troops with an adequate landing field or to give the amphibian jeep a solid footing upon shifting sands.

Landings . . . . Transport for Sea and Shore

Signal Corps Photo

Unlike Napoleon's army traveling on its stomach, modern mechanized armies travel largely on roads. Since these are heavily mined or otherwise rendered unusable by retreating Nazis, invading Allied forces are frequently compelled to start from scratch and build entirely new roads. Welded equipment such as tractors, bulldozers, power shovels, carryall scrapers, rooters, etc., is vital to the roadbuilding process. The top picture shows a LeTourneau "Angledozer" on a Caterpillar tractor as they are conveyed to enemy shore by a landing barge.

Courtesy, R. G. LeTourneau, Inc.

Small welded bulldozers can be picked up by plane and whisked hundreds of miles through the air to assist in roadbuilding. Left is a unit being used at an eastern Air-Borne Engineer training center. This has a 44 hp engine and a scraper carrying 2.2 cu yd.

Below, right: Labor battalions constructing an operation ramp in desolate Attu—one of our early stops en route to Tokio. Note the landing craft at sides.

Below, left: Navy Seabees are constructing and welding a wire mesh road on the shifting sands of a beachhead that has been seized by Allied forces.

Official U. S. Navy Photo

Acme News Photo

For Maintenance . . .

THIS world-wide war calls for mechanized equipment able to perform in desert heat or arctic cold, in jungle swamps or rarified mountain air. The need for maintenance work is obvious.

Fighting lines move faster than supply lines, but the mobile welding shops of U. S. Army Engineers can keep pace. In such shops are experienced weldors ready to reinforce worn or repair broken machine parts, replace castings with welded fabrication, build jigs to aid in the assembly of equipment, make emergency replacement items for guns, tanks and planes. Flame-cutting enables repair parts to be quickly and easily shaped from steel stock and is also indispensable to salvage operations.

Heavy construction equipment—needed to break trails and to build roads and airports—must likewise be maintained by welding. Parts of equipment exposed to excessive wear must be protected by deposits of hard-facing.

Signal Corps Photo

In Algiers. Members of the Railway Workshop Company, Railroad Engineers, are welding boiler plate to restore a locomotive to operating condition.

Courtesy, U.S. Army Engineers

Left: Maintenance is preventive as well as curative. Here a track roller of a crawler tractor is being hard-faced with a wear-resistant alloy.

Below: Welding a radiator grill at one of the Army's "Welding Shops on Wheels." This portable weldery carries equipment for both gas and arc welding, flame-cutting, brazing and soldering. Small electric tools such as drills and grinders may be operated off the welder generator as can an electric light for night operation.

Signal Corps Photo

Somewhere in New Guinea! C. J. Summers of Oil City, Pa., welding bars of a stationary hoist he is building for the motor maintenance section.

Courtesy, Hobart Brothers Co.

Convention in Chicago

The 24th Annual Meeting of the American Welding Society will be held in the Morrison Hotel, Chicago, October 18 to 21. On the four-day program are 19 technical sessions and 65 papers.

DAVID ARNOTT, American Bureau of Shipping, who will be installed as 1943-44 president of the American Welding Society at this year's annual meeting.

After an absence of four years, the American Welding Society is returning to Chicago from October 18 to October 21 inclusive for its 24th annual meeting. The Morrison—the world's tallest hotel—will be convention headquarters.

Streamlined Conference

The streamlined four-day convention is being held simultaneously with meetings of the American Society for Metals, the Wire Association and the Steel and Metal Division of Mining and Metallurgical Engineers. Like the 1942 meeting, this year's welding convention will be stripped of the social activities which in the past have highlighted the meetings of welding engineers and production men. Social gatherings have been put aside for concentrated thinking on war production and on the use of welding in the war effort. The tentative program of the American Welding Society calls for 19 technical sessions, at which there will be presented 65 papers covering all phases of welding and cutting. Special emphasis is being placed on resistance welding, aircraft welding and ship welding—each of these subjects will be discussed at two or more technical sessions.

The Adams Lecture

The annual meeting will be called to order on Monday morning, October 18, by K. L. Hanson, retiring president of the American Welding Society. After the presentation of medals and prizes, the initial Adams lecture will be presented by Dr. C. A. Adams, first president of the American Welding Society. The Adams lecture will henceforth be an annual feature of the AWS convention.

Simultaneous technical sessions begin on Monday afternoon and will continue morning and afternoon until noon Thursday. Thursday afternoon will be devoted to the Society's annual business meeting. This will be followed by the board of directors' meeting, which will conclude the program on October 21.

Subjects Covered

The papers presented at the various technical sessions will cover such subjects as: cutting, railroad welding, weldability of materials, resistance welding, tube welding, flame-hardening and hard-facing, ship welding, welding research, aircraft welding, welding of non-ferrous materials, pipe welding, inspection, qualification and testing, repair and maintenance welding, production welding and the welding of pressure vessels.

On Monday evening in the Mural Room, there will be held an additional session which will be of considerable interest to all visitors at the annual meeting. This session will include the showing of a movie, "Atomic Hydrogen Welding," and will be featured by an address on "Welding in Ordnance Construction" by Col. S. B. Ritchie. On Tuesday evening, there will be committee meetings dealing with resistance welding standards and safety recommendations. Wednesday evening will be devoted to the AWS section officers' dinner and conference and to a resistance welding research committee meeting.

IAA Luncheon

The International Acetylene Association has decided to dispense with technical meetings for the duration but will convene for a business meeting and luncheon on Tuesday. This noonday meeting will replace the customary annual IAA conference.

The president will give his annual report at the business meeting to take place at 2:00 P.M. on Thursday. At this time, First Vice-President David Arnott, American Bureau of Shipping, New York City, will be installed as president. Other 1943-44 officers to be installed are: Isaac Harter, vice-president of Babbock and Wilcox Co., Barberton, O., as first vice-president; and A. C. Weigel, vice-president of Combustion Engineering Co., Inc., New York City, as second vice-president.

Immediately following the business meeting, the annual meeting of the board of directors brings to a close what will undoubtedly be a highly informative week of welding progress. The tentative program of the technical sessions of the 24th meeting is reproduced in full on the pages which follow.

Program for the 24th Annual AWS Meeting

Hotel Morrison, Chicago, Week of October 18, 1943

MONDAY, OCTOBER 18th

9:30 A.M.—Morning—Opening Session

Chairman: K. L. HANSEN, President, American Welding Society. Vice-Chairman: E. V. DAVID, Chairman, Convention Committee.

PRESENTATION OF MEDALS AND PRIZES

The Adams Lecture, by DR. C. A. ADAMS, First President, American Welding Society.

2:00 P.M.—Monday Afternoon—Simultaneous Technical Sessions

CUTTING

Chairman: ELLSWORTH L. MILLS, Bastian-Blessing Co. Vice-Chairman: H. E. ROCKEFELLER, The Linde Air Products Co.

"Flame-Cutting Heavy Sections and Large Diameters," by R. L. DEILY and E. BENYO, Bethlehem Steel Company.

"Rolling Mill Maintenance and Production Welding Problems," by T. W. MORGAN, American Rolling Mill Co.

"Electronic Control of Gas-Cutting Machines," by R. D. MCCOMB, General Electric Co.

"Machine-Cutting for Assembly Line Fabrication," by CHARLES O. ADAMS, Delco Products.

RAILROAD

Chairman: A. G. OEHLER, Editor, *Railway Age*. Vice-Chairman: C. E. MORGAN, Chicago, Milwaukee & St. Paul R. R.

"The Welded Locomotive Boiler," by E. G. YOUNG, University of Illinois.

"Welding as It Applies to Railroads," by ROBERT MORAN, Missouri Pacific R. R.

"Locomotive Parts Fabrication and Welding of Bronze Bearing Surfaces," by J. W. KENEFIC, Air Reduction Sales Co.

"Welding of Railroad Transport Equipment," by C. DREUTZLER, Electro-Motive Corp.

WELDABILITY

Chairman: A. B. KINZEL, Union Carbide & Carbon Res. Labs. Vice-Chairman: C. H. JENNINGS, Westinghouse Elec. & Mfg. Co.

"A System for the Preservation of Ductility in Weldments," by GILBERT E. DOAN and ROBERT D. STOUT, Lehigh University.

"Cooling Rates Associated with Arc Welding and Their Application to the Selection of Welding Conditions," by WENDELL F. HESS, L. L. MERRILL, E. F. NIPPES, JR., and A. P. BUNK, Rensselaer Polytechnic Institute.

"The Weldability of Silicon Steels," by C. E. JACKSON and G. G. LUTHER, Naval Research Laboratory.

"Weld Bead Hardness Tests on Some Carbon, Nickel and Nickel-Chromium War Department Steels," by OSCAR E. HARDER and C. B. VOLDRICH, Battelle Memorial Institute.

7:30 P.M.—Monday Evening—Educational Session

Chairman: E. R. SEABLOOM, Crane Company. Vice-Chairman: R. E. MCFARLAND, Western Electric Co.

General Electric Film on Atomic Hydrogen Welding.

An Address on Welding in Ordnance Construction, by COL. S. B. RITCHIE, Chief of the Service Branch of the Office of the Chief of Ordnance.

TUESDAY, OCTOBER 19th

9:30 A.M.—Morning—Simultaneous Technical Sessions

RESISTANCE WELDING

Chairman: A. F. DAVIS, The Lincoln Electric Co. Vice-Chairman: C. L. PFEIFFER, Western Electric Co.

"Flash Welding of Alloy Steels," by C. M. MANZER, General Electric Co.

"The Spot Welding of Heavy Gauges of Carbon and Alloy Steels," by JOHN C. BARRETT, Taylor-Winfield Corp.

"The Spot Welding of the Carbon Steels SAE 1020, SAE 1035 and SAE 1045 in the 0.040-In. Thickness," by WENDELL F. HESS and D. C. HERRSCHAFT, Rensselaer Polytechnic Institute.

TUBING

Chairman: J. P. DODS, Summerill Tubing Co. Vice-Chairman: H. S. CARD, Formed Steel Tube Institute.

"Electric Resistance Welded Steel Tubing—Its Quality Control and Application," by R. D. MALM, Clayton Mark & Co.

"Machine Welded Metal Tubing," by G. C. GRIDLEY, Mechanics Universal Joint Div., Borg-Warner Corp.

"Gas Weld and Furnace Weld Tubing for Construction Purposes," by A. C. WEBER, Laclede Steel Co.

FLAME-HARDENING AND HARD-FACING

Chairman: D. H. COREY, The Detroit Edison Co. Vice-Chairman: R. G. HAWLEY, Link-Belt Ordnance Co.

"Ordnance Flame-Hardening," by STEPHEN SMITH, Air Reduction Sales Co.

"Hard-Facing in the War on Wear," by J. A. GALLAHER, Haynes Stellite Co.

"Reclamation by Hard-Facing," by F. G. JONES, Wall-Colmonoy Corp.

SHIPS

Chairman: DAVID ARNOTT, American Bureau of Shipping. Vice-Chairman: F. M. SCOTTEN, Great Lakes Engineering Works.

"Prefabrication of Welded Ships in a Structural Steel Plant," by E. T. BLIX and J. C. ARNTZEN, Mississippi Valley Structural Steel Co.

"The Control of Welding in Ship-building," by R. W. BRENDLE, Tampa Shipbuilding Co.

"Cracking in Ship Construction," report of Thermal Stress Subcommittee of AWS Marine Committee, by H. W. PIERCE, chairman.

2:00 P.M.—Tuesday Afternoon—Simultaneous Technical Sessions

RESISTANCE WELDING

Chairman: R. E. POWELL, Western Electric Co. Vice-Chairman: B. L. WISE, Federal Machine and Welder Co.

"Why the Weld Recorder," by J. R. FETCHER and J. VAN DEN BEEMT, E. G. Budd Mfg. Co.

"Double Pressure Systems as Applied to Resistance Welding Machines," by S. M. HUMPHREY, Taylor-Winfield Corp.

"Stored Energy Welding of Mild Steel," by J. M. DIEBOLD, Yellow Truck and Coach Mfg. Co.

"Flash Welding of Nickel and High Nickel Alloy Rod," by W. F. HESS and A. MULLER, Rensselaer Polytechnic Institute.

SHIPS

Chairman: JAMES C. BLAKE, Commander, USNR, Bureau of Ships. Vice-Chairman: H. W. PIERCE, New York Shipbuilding Corp.

"Planning for Production Welding and Cutting in a Modern Shipyard," by W. B. BOWEN, Ingalls Shipbuilding Corp.

"Thermit Welding in Maritime Commission Work," by J. H. DEPPELER, Metal and Thermit Corp.

"Longitudinal Welded Joints," by A. G. BISSELL, Bureau of Ships, Navy Dept.

RESEARCH

Chairman: H. C. BOARDMAN, Chicago Bridge & Iron Co. Vice-Chairman: T. S. FULLER, General Electric Co.

"Fatigue Strength of Fillet Welded Joints," by W. M. WILSON, University of Illinois.

"Discussion of Means for Evaluating Weldability of Alloy Steels," by 1st Lt. S. A. HERRES, Watertown Arsenal.

"Establishment of Cooling Curves of Welds by Means of Electrical Analogy," by VICTOR PASCHKIS, Columbia University.

"Correlation of Structure and Strength of Spot Welds in Aluminum Alloys," by DANA SMITH and F. KELLER, Aluminum Company of America.

7:30 P.M.—Tuesday Evening

University Research Conference—H. C. BOARDMAN, Chairman, Presiding.

WEDNESDAY, OCTOBER 20th

9:30 A.M.—Morning—Simultaneous Technical Sessions

AIRCRAFT

Chairman: G. N. SIEGER, S-M-S Corp. Vice-Chairman: J. R. DAWSON, Union Carbide & Carbon Res. Labs.

"Fatigue Strength of Welded Aircraft Joints," by T. V. BUCKWALTER, The Timken Roller Bearing Co.

"The Spot Weldability of Low Carbon and Other Aircraft Steels," by L. C. BIBBER and JULIUS HEUSCHKEL, Carnegie-Illinois Steel Corp.

Weldability Tests of Aircraft Structural Steels," by C. B. VOLDRICH and R. D. WILLIAMS, Battelle Memorial Institute.

NON-FERROUS WELDING AND BRAZING

Chairman: R. L. KOHLBRY, Machinery and Welder Corp. Vice-Chairman: E. E. ISGREN, R. G. LeTourneau, Inc.

"Modern Welding Methods for Copper and Copper Alloys," by J. J. VREELAND, Chase Brass and Copper Co. Inc.

"Carbon Arc Welding of Naval Brass," by KENNETH L. WALKER, Foster Wheeler Corp.

"Aluminum Brazing Sheet—Fundamentals of Metal Flow," by M. A. MILLER, Aluminum Research Laboratories.

PIPING

Chairman: F. C. FANTZ, Midwest Piping and Supply Co. Vice-Chairman: F. C. FYKE, Standard Oil Development Co.

Oxy-Acetylene Distribution Systems," by D. F. GUTHRIE and R. W. STEWART, Air Reduction Sales Co.

"Field Welding of Steel Penstocks and Tunnel Linings," by L. G. CHRISTOFFERSON, Chicago Bridge & Iron Co.

"Weldability of 27% Chrome-Steel Pipe," by R. A. MUELLER, I. H. CARLSON and E. R. SEABLOOM, Crane Co.

2:00 P.M.—Wednesday Afternoon—Simultaneous Sessions

AIRCRAFT

"Production Spot Welding Testing," by CAPT. J. K. DAWSON, AUS, Automotive Section, T.I.S.

Chairman: G. S. MIKHALAPOV, War Metallurgy Committee, National Research Council. Vice-Chairman: R. T. GILLETTE, General Electric Co.

"Fatigue Studies of Welded Test Triangular Structures with NE8630 Steels," by A. J. WILLIAMSON, Summerill Tubing Co.

"Fabrication and Welding of Aircraft Exhaust Tubing-Manifolds and Headers," by C. D. LAFOND, Buhl Stamping Co.

"Metallic Arc Welded X4130 Steel Tubing," by W. T. TIFFIN, University of Oklahoma.

INSPECTION, QUALIFICATION AND TRAINING

Chairman: O. B. J. FRASER, International Nickel Co. Vice-Chairman: L. M. SKIDMORE, General Motors Institute.

Symposium on Applicable Methods of Inspection of Arc Welding for

(1) Shipbuilding—J. LYELL WILSON
(2) Structural—R. B. LINCOLN
(3) Pressure Vessels and Piping—W. D. HALSEY
(4) Aircraft—J. B. JOHNSON
(5) Machinery—N. L. MOCHEL

"Welding Operator Training," by A. N. KUGLER, Air Reduction Sales Co.

REPAIR AND MAINTENANCE

Chairman: L. S. McPHEE, Whiting Corp. Vice-Chairman: E. C. BRECKELBAUM, Harnischfeger Corp.

"Bronze Welding in the Design and Maintenance of Forming Dies," by C. E. SWIFT, Ampco Metal, Inc.

"The Job Shop—Past, Present and Future," by F. W. SHACKLETON, Central Ohio Welding Co.

"Maintenance of Tools and Equipment," by T. B. JEFFERSON, Editor, THE WELDING ENGINEER.

"Reclamation of Perishable Tools by Low Temperature Brazing," by W. A. JOHNSON, International Harvester Co.

6:30 P.M.—Wednesday Evening—Section Officers Dinner and Conference

THURSDAY, OCTOBER 21st

9:30 A.M.—Morning—Simultaneous Technical Sessions

AIRCRAFT

Chairman: P. H. MERRIMAN, Glenn L. Martin Co. Vice-Chairman: H. O. KLINKE, Republic Aviation Corp.

"Quality Control of Aircraft Spot Welding," by NATHAN C. CLARK, Lockheed Aircraft Research Lab.

"The Application of Flash Welding in Airplane Construction," by C. B. SMITH, Douglas Airplane Co.

"Spot Weld Joint Efficiency for Aluminum Alloys," by C. W. STEWARD, Curtiss-Wright Corp. Research Laboratory.

"Spot Welding of Magnesium Alloys," by W. S. LOOSE, Aircraft Welding Research Committee WRC.

PRODUCTION

Chairman: A. M. CANDY, Hollup Corp. Vice-Chairman: OTIS L. SMITH, Weldit Acetylene Co.

"Automatic Arc Welding Solves Production Problems," by R. F. WYER, General Electric Co.

"Transition from Riveted to Welded Construction of Light Combat Tanks," by WM. C. OSHA and J. W. SHEFFER, American Car and Foundry Co.

"Welding of Armored Tanks," by WILLIAM BOESE, Pullman-Standard Car Mfg. Co.

PRESSURE VESSELS AND PIPING

Chairman: ISAAC HARTER, Babcock & Wilcox Co. Vice-Chairman: W. E. CRAWFORD, A. O. Smith Corp.

"War Emergency Codes for Welded Pressure Vessels," by E. R. FISH, Hartford Steam Boiler Insp. & Ins. Co.

"The Hammer Test for Welded Pressure Vessels: An Investigation," by C. O. DOHRENWEND, Armour Research Foundation.

"The Effect of Normalizing on the Properties of Welds in Carbon-Molybdenum Steel Pipe," by I. A. ROHRIG, D. H. COREY and SABIN CROCKER, The Detroit Edison Co.

2:00 P.M.—Thursday Afternoon—Business Meeting

3:00 P.M.—Thursday Afternoon—Board of Directors' Meeting

Winning with Welded Ships

With welding and flame-cutting, Liberty ships are being produced at a rate of five a day to meet war's colossal demands for ship tonnage.

AMERICAN shipyards have delivered nearly 18,000,000 deadweight tons of shipping since Pearl Harbor, and by next January we shall have built in two years the equivalent of more than a third of all the oceangoing merchant marine tonnage in the world before the war began. The rapidity with which ships are being built is a striking example of one of the ways welding is contributing to our ultimate victory over the Axis.

One Division — 15 Ships

The doughboy of 1917 landed with only his bedding roll and his rifle. Today, the Army lands from five to ten tons of equipment for each man, and it takes more than a ton each month to maintain him.

To transport overseas the approximately 3,700 vehicles and the equipment of one armor division takes 15 Liberty ships—in addition to troop ships. An armored division in action and on the move uses 650 tons of gasoline, 600 tons of ammunition and 35 tons of food a day. One Liberty ship has to arrive every eight days in order to maintain an armored division in battle.

The Liberty Ship

About one quarter of the United Nations' tonnage is in Liberty ships. By the end of the year, nearly every third ship will be this standardized 10,500 ton, 442 foot, conventional freighter with an average speed of 11 knots.

The Liberty ship lacks the refinements that will be found in the "C" type cargo vessels which the Maritime Commission started building in 1937 in an attempt to revive America's Merchant Marine. The living quarters, equipment and hull of the Liberty ship are standardized as far as possible. It was formerly the practice to outfit ships piecemeal, but in the building of Liberty ships the lines of material flow into preassembly buildings where thousands of small parts are put together into finished units. Only the final installation takes place on the ship.

Prefabrication of hull parts, another new wrinkle in shipbuilding, has taken great strides. Arc welding and flame-cutting permit the construction of sections away from a limited space on the shipways. Powerful cranes lift the large prefabricated sections into position. The welded ship (although it may have some riveted parts) is lighter than its predecessor and has a superior ability to withstand bombs.

From Six Months to 52 Days

Before Pearl Harbor, construction contracts on the Liberties called for six months' construction time. The first Liberty, *Patrick Henry*, required 244 days. Early in 1942, schedules calling for Liberties in 105 days from keel laying to delivery were received —with skepticism. The 105 day objective, however, was reached *on an average for all ships launched* in July, 1942. Progress continued to be made. By January, 1943, 79 Liberties were delivered by all yards, and these ships averaged 52.6 days from keel laying to delivery (with steam up, ready to take a cargo).

About 40 of these 52.6 days were spent on the ways and about 12 days in the outfitting docks after launching. Since 60 days on the ways had been contemplated in the original 105 day schedule, a 50% average increase in shipbuilding capacity has been gained. The average, it should be noted, includes the fastest yards and the slowest, and there is a great disparity between them.

Down to Seven Days

The act of cutting down the building time of a 10,500 ton ship from 244 days to seven days—the time consumed in building the *Robert E. Peary* at the Kaiser Richmond Yard —was not an accident. Behind this phenomenal feat lies the Maritime Commission's experience from 1936 to '39 and its intensive planning when war seemed imminent.

In the last war, the Emergency Fleet Corporation concentrated its construction of freighters (smaller but comparable to Liberties) at the Hog Island Yard near Philadelphia. The shortest average building time for ships delivered in any one month at Hog Island was 249.8 days, and eight was the greatest number of ships delivered in any month at Hog Island's 50 ways. In contrast, the Oregon Shipbuilding Corp., delivered 17 ships in June, 1943, from only 11 ways, and the average was 27.8 days. An idea of how Liberty ships are built on such a fast schedule may be obtained from the illustrations on the opposite page, which show the progress that is made from day to day in the building of a Liberty ship.

Liberties into Tankers

In our mechanized war, the transportation across the water of gasoline and other fuels has presented a problem. To meet this situation, 102 Liberty ships have been converted into oil carriers. Through steps such as the reinforcement of bulkheads, installation of extra ventilating systems, additional piping, pumping equipment, etc., these vessels are enabled to serve as tankers with a capacity of 65,000 to 70,000 bbl each. Welding and flame-cutting are, of course, indispensable to the changeover.

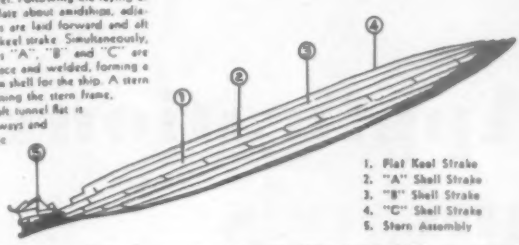
Welding has played a most important part in the construction of merchant ships, yet it is playing an even more important role in the maintenance and repair of merchant ships at war. These ships may limp home damaged by torpedoes, mines and bombs. Moreover, convoy ships carrying cargos may bend propellers and weaken plates running through icy lanes, run aground in badly charted waters or, perhaps, collide with each other on foggy nights. Time lost under repair is an important element in cutting down the effective work of our merchant fleet. Even in summer, 5% of our tonnage is laid up for repairs; in winter, the "invalids" may run as high as 12%. In addition, a lot of time is lost by ships waiting their turns in drydock. In one month, there were 783 oceangoing vessels under repair in 40 United States repair yards, while only 492 overhauled ships were sent back to sea.

Welding and cutting have aided in the performance of repair feats which at one time would have been considered a stark impossibility. Repair experts have put together the two halves of tankers salvaged from the sea bottom, duplicated lost stern sections and straightened buckled keels. Whether or not to perform these major maritime surgical operations depends upon the comparative time to build a new ship and the margin of new ship tonnage in service. The time that can be gained by the use of welding often makes the salvage operation worthwhile.

This series of bird's eye views shows how Liberty Ships grow step by step from keel to delivered vessel.

I — 1st Day

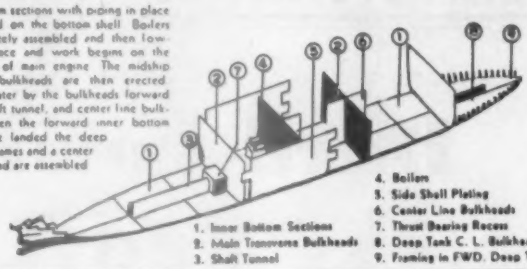
The beginning of the Liberty Ship is the laying of the keel. Following the laying of the first Keel Plate about amidships, adjacent keel plates are laid forward and aft completing the keel strake. Simultaneously, the shell strakes "A", "B" and "C" are worked into place and welded, forming a complete bottom shell for the ship. A stern assembly containing the stern frame, framing, and shaft tunnel flat is landed on the ways and welded in place.



1. Flat Keel Strake
2. "A" Shell Strake
3. "B" Shell Strake
4. "C" Shell Strake
5. Stern Assembly

II — 2nd and 3rd Day

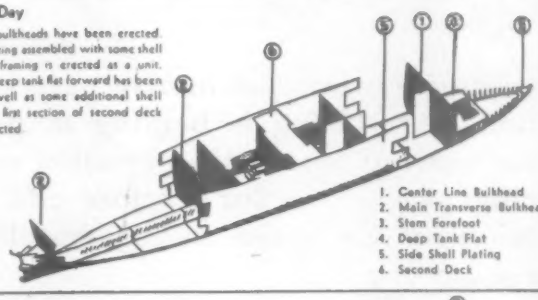
Inner bottom sections with piping in place are welded on the bottom shell. Boilers are completely assembled and then lowered in place and work begins on the installation of main engine. The midship transverse bulkheads are then erected, followed later by the bulkheads forward and the shaft tunnel, and center line bulkheads. When the forward inner bottom sections are landed the deep tank shell frames and a center line bulkhead are assembled as a unit.



1. Inner Bottom Sections
2. Main Transverse Bulkheads
3. Shaft Tunnel
4. Boilers
5. Side Shell Plating
6. Center Line Bulkheads
7. Thrust Bearing Recess
8. Deep Tank C. L. Bulkhead
9. Framing in FWD. Deep Tank

III — 4th Day

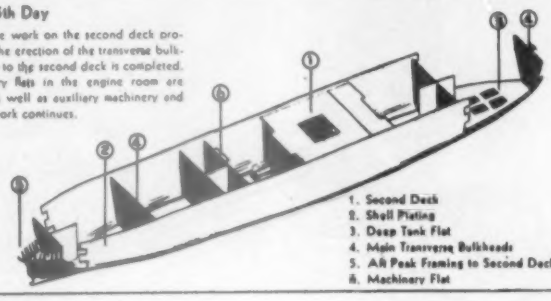
Additional bulkheads have been erected. The stem casting assembled with some shell plating and framing is erected as a unit. Half of the deep tank flat forward has been erected as well as some additional shell plating. The first section of second deck has been erected.



1. Center Line Bulkhead
2. Main Transverse Bulkhead
3. Stem Forefoot
4. Deep Tank Flat
5. Side Shell Plating
6. Second Deck

IV — 5th Day

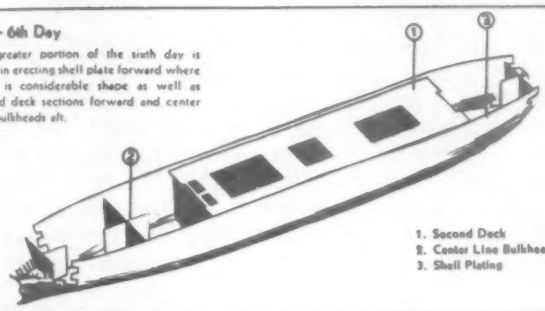
While the work on the second deck progresses, the erection of the transverse bulkheads up to the second deck is completed. Machinery flats in the engine room are added as well as auxiliary machinery and piping work continues.



1. Second Deck
2. Shell Plating
3. Deep Tank Flat
4. Main Transverse Bulkheads
5. Aft Peak Framing to Second Deck
6. Machinery Flat

V — 6th Day

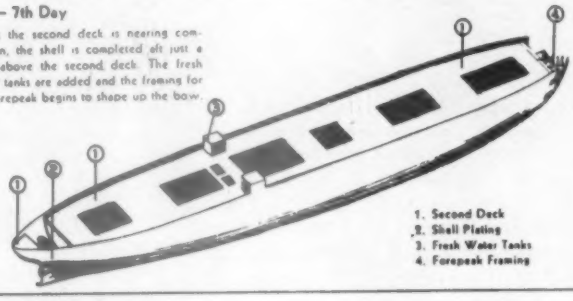
The greater portion of the sixth day is spent in erecting shell plate forward where there is considerable shape as well as second deck sections forward and center line bulkheads aft.



1. Second Deck
2. Center Line Bulkheads
3. Shell Plating

VI — 7th Day

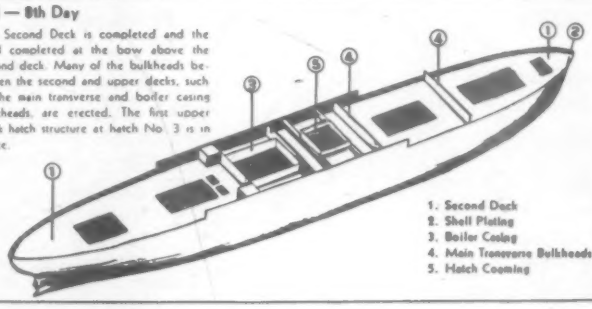
While the second deck is nearing completion, the shell is completed aft just a little above the second deck. The fresh water tanks are added and the framing for the forepeak begins to shape up the bow.



1. Second Deck
2. Shell Plating
3. Fresh Water Tanks
4. Forepeak Framing

VII — 8th Day

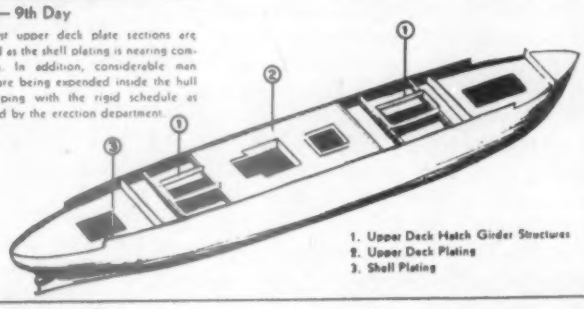
The Second Deck is completed and the shell completed at the bow above the second deck. Many of the bulkheads between the second and upper decks, such as the main transverse and boiler casing bulkheads, are erected. The first upper deck hatch structure at hatch No. 3 is in place.



1. Second Deck
2. Shell Plating
3. Boiler Casing
4. Main Transverse Bulkheads
5. Hatch Coaming

VIII — 9th Day

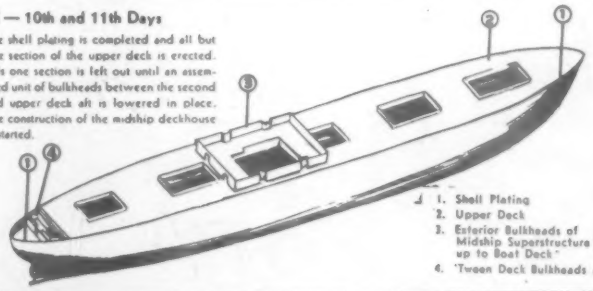
The first upper deck plate sections are erected as the shell plating is nearing completion. In addition, considerable man hours are being expended inside the hull in keeping with the rigid schedule as planned by the erection department.



1. Upper Deck Hatch Girder Structures
2. Upper Deck Plating
3. Shell Plating

IX — 10th and 11th Days

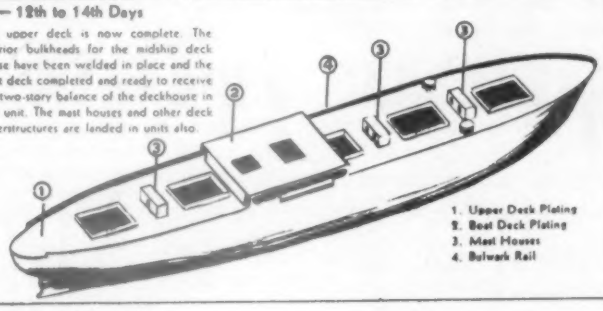
The shell plating is completed and all but one section of the upper deck is erected. This one section is left out until an assembled unit of bulkheads between the second and upper deck aft is lowered in place. The construction of the midship deckhouse is started.



1. Shell Plating
2. Upper Deck
3. Exterior Bulkheads of Midship Superstructure up to Boat Deck
4. 'Tween Deck Bulkheads Aft

X — 12th to 14th Days

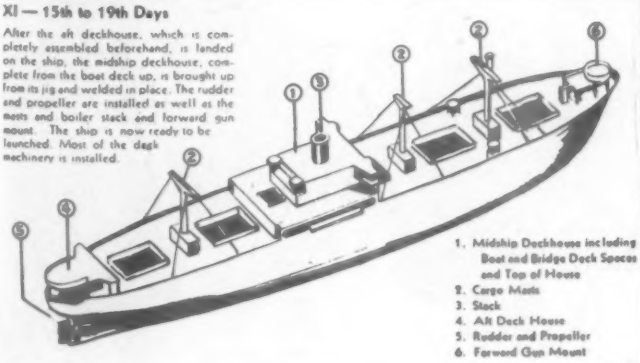
The upper deck is now complete. The interior bulkheads for the midship deck house have been welded in place and the boat deck completed and ready to receive the two-story balance of the deckhouse in one unit. The mast houses and other deck superstructures are landed in units also.



1. Upper Deck Plating
2. Boat Deck Plating
3. Mast Houses
4. Bulwark Rail

XI — 13th to 19th Days

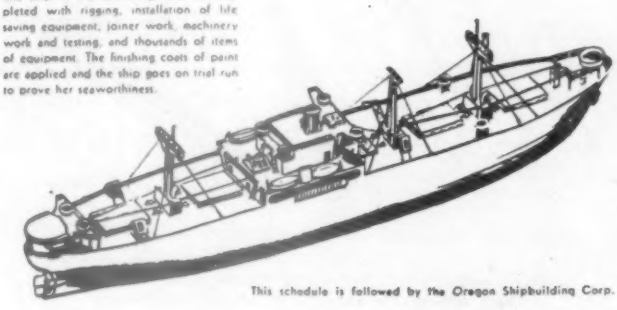
After the aft deckhouse, which is completely assembled beforehand, is landed on the ship, the midship deckhouse, complete from the boat deck up, is brought up from its jig and welded in place. The rudder and propeller are installed as well as the masts and boiler stack and forward gun mount. The ship is now ready to be launched. Most of the deck machinery is installed.



1. Midship Deckhouse including Boat and Bridge Deck Spaces and Top of House
2. Cargo Masts
3. Stack
4. Aft Deck House
5. Rudder and Propeller
6. Forward Gun Mount

XII — 20th to 27th Days

The ship in the Outfitting Basin is completed with rigging, installation of life saving equipment, joiner work, machinery work and testing, and thousands of items of equipment. The finishing coats of paint are applied and the ship goes on trial run to prove her seaworthiness.



This schedule is followed by the Oregon Shipbuilding Corp.

Hard-Facing Applications and Techniques*

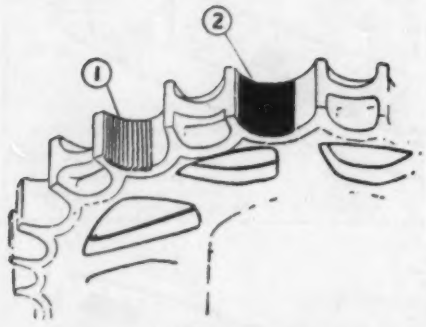


Fig. 1—Method of hard-facing tractor sprocket: (1) High carbon steel deposit; (2) Class I hard-facing.

***Part Two—By restoring worn automotive parts to new or better condition, hard-facing is helping to prevent breakdowns in our overburdened transportation system. Specific hard-facing procedures for tractors and other earth-moving equipment are given in this installment.**

The first part of this two-part article (pages 30 to 33, September, 1943, issue of The Welding Engineer*) discussed in general the techniques of hard-facing by welding a layer of hard wear-resistant alloy on the surface of a softer base metal normally subjected to wear. This part described the five major classes of hard-facing rods and listed representative automotive parts which may be advantageously hard-faced. The present installment is confined entirely to hard-facing applications on tractor parts and on the wearing surfaces of earth-moving equipment.*

The application of hard-facing rod to a tractor drive sprocket wheel will extend its life by two to three times that of one not protected. Because the hard metal deposit has a low coefficient of friction, hard-facing also reduces wear on track pad bushings, which are both expensive and difficult to replace.

Tractor drive sprockets are not hard-faced when new but are allowed to wear until play develops between the sprocket teeth and track pad bushings. The sprockets are then rebuilt to their original size and shape with a suitable Class I (iron or steel alloy with less than 20% of alloying constituents) hard-facing rod.

As an example of the material requirements, two drive sprockets from an RD 8 Caterpillar tractor will require 25 to 30 lb (depending on extent of wear) of 3/16 in. coated hard-facing rod.

The proper hard-facing procedure is to leave the sprockets on the tractor, but block it up so the sprocket wheel can be turned during the welding operation. The worn areas are filled in with a 3/16 in. Class I rod, using a template made from a new sprocket wheel to obtain the proper shape. The bead should be applied transversely and the deposit of each rod peened while hot. In cases of extreme wear, it is sometimes necessary to rebuild with a high carbon steel rod before applying hard-facing alloy (see Fig. 1).

Tractor Track Rails

Twenty lb of 3/16 in. high carbon steel rod, 40 lb of 3/16 in. coated Class I hard-facing rod and 15 lb of 3/16 in. coated mild steel electrodes were needed to rebuild the rails from an RD 8 Caterpillar tractor.

The rebuilding and hard-facing

*Prepared for Vehicle Maintenance Section, Division of Motor Transport, Office of Defense Transportation.

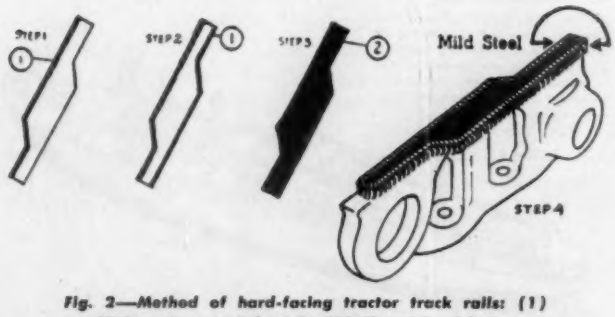
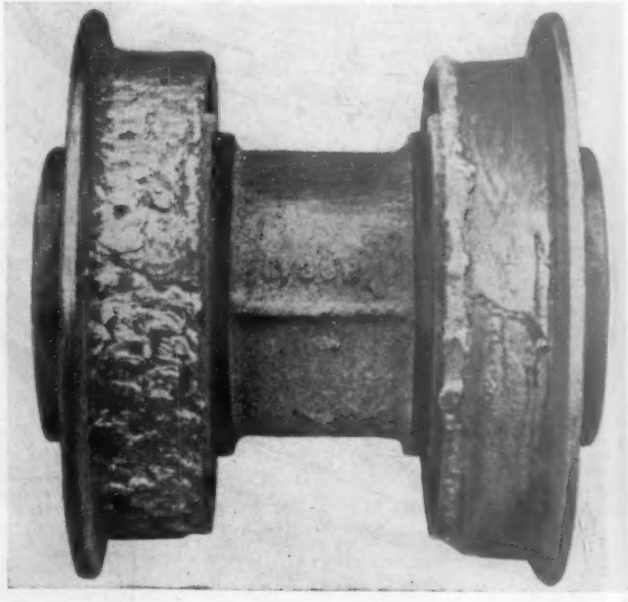


Fig. 2—Method of hard-facing tractor track rails: (1) High carbon steel deposit; (2) Class I hard-facing.

Hard-facing track roller of a crawler-type tractor. A guide bead is first deposited around the inner edge of the tire.



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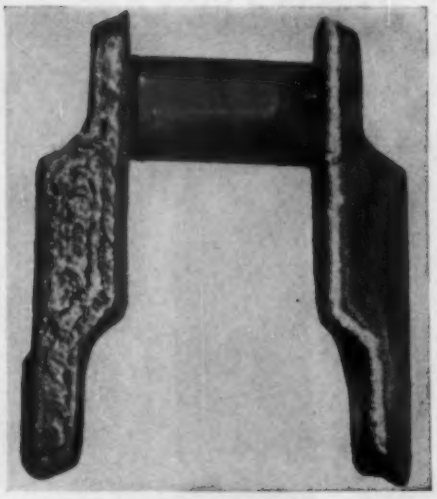


How a guide bead is used in hard-facing a track link of a crawler-type tractor.

procedure is shown in Fig. 2. The track should be laid out on the floor and a bead of high carbon rod applied to one side of 12 rails as shown in Step 1, Fig. 2. Then return and apply a bead to the opposite sides of the 12 rails as in step 2. Between the guide beads, apply the weaving bead of $\frac{3}{16}$ in. coated Class I hard-facing rod as in Step 3. Each deposit of hard-facing rod should be peened while hot. The final step (4 in Fig. 2) is to apply a "tie-in" bead of coated mild steel rod to the sides of the rails. Rail ends should be checked for proper clearance and any excess material removed with the cutting torch.

Worn tractor rails, reconditioned as explained above, will outlast new rails by 25% to 50%. The hard-facing application can be repeated whenever necessary. It should be noted, however, that the hard-facing of tractor track rails is limited to those which can be rebuilt by the application of one layer of metal.

Tractor Idler Wheels

Tractor idler wheels are usually allowed to wear until they no longer operate efficiently. They are then repaired by the application of high carbon steel electrodes and given a final overlay of suitable Class I hard-facing rod. This is another operation that can be repeated many times before the part is finally scrapped. Moreover, a worn idler hard-faced with Class I rod will outlast two new idlers.

The amount of material required for the application is approximately 15% of the weight of the idler. As an example, two idlers from an RD 8 Caterpillar tractor required 50 lb of $\frac{3}{16}$ in. high carbon steel electrodes and 30 lb of $\frac{3}{16}$ in. coated Class I hard-facing rods.

Fig. 3 shows the rebuilding and hard-facing procedure. Idler wheels are often left on the tractor during the rebuilding operation, but, if desired, they can be removed and mounted into a fixture. In either event, low spots on guides and shoulders are filled in with high carbon steel electrodes, and a final overlay of coated Class I hard-facing rod is applied to retard future wear.

Tractor Track Rollers

The hard-facing of tractor track rollers is strictly a rebuilding operation. Any type of steel roller can be rebuilt with satisfactory results. The hard-facing of cast iron rollers is not recommended.

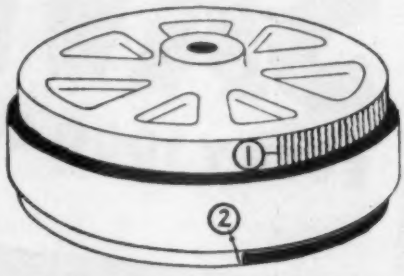


Fig. 3—Method of hard-facing tractor idler wheels: (1) High carbon steel deposit; (2) Class I hard-facing.

Hard-faced rollers will outlast the best type of new roller obtainable by an average of 200%. The hard-facing operation can be repeated as often as necessary. A set of rollers on a large tractor weighs more than 1,000 lb. To reclaim these rollers by hard-facing requires a maximum of 96 lb of rods.

Initial step in the hard-facing procedure (Fig. 4) is to construct a jig so that the rollers can be turned during the welding operation. The area to be rebuilt is cleaned on a buffer or a grinding wheel. If the roller is the single-flange type, a guide bead is applied to the outer edge as in Sketch 1, Fig. 4. One or two layers of suitable hard-facing rod are applied between the guide bead and the flange as in Sketch 2, and a weaving bead is applied to the flange as in Sketch 3. For best results, the deposit of each rod should be peened while hot. If desired, hard metal deposits may be rough-ground, but grinding is not absolutely necessary.

Tractor Grousers

To minimize wear on tractor grousers, the tops of their cleats should be hard-faced with a suitable $\frac{1}{4}$ in. coated Class I hard-facing rod before the tractor is put into service. When this deposit wears away, the grouser should immediately be hard-faced again. Worn grousers may also be hard-faced, but cleats should first be rebuilt to original size by welding on a steel bar of the proper size.

Class I hard-facing rod is so much more wear-resistant than ordinary steel that one layer applied to the top of the cleat will extend the grouser life 100%. Since the hard-facing operation can be repeated four or five times before the grouser is finally discarded, and since each deposit represents only one-fiftieth of the weight of a new grouser, this application saves much steel and also eliminates the transporting of several sets of spare grouser plates.

Material requirements for rebuilding and hard-facing a worn grouser are: mild steel bar stock $\frac{3}{4}$ by 1 in.; 1 lb of $\frac{3}{16}$ in. coated mild steel electrodes; $\frac{1}{2}$ lb of $\frac{1}{4}$ in. coated Class I hard-facing rod.

A new grouser requires $\frac{1}{2}$ lb of $\frac{1}{4}$ in. coated Class I hard-facing rod.

The procedure for reclaiming worn grousers is to rebuild the worn cleat to its original height by cutting the bar stock to proper length and welding it on with mild steel electrodes. The top of the cleat should then be hard-faced with Class I rod.

New grousers are hard-faced as

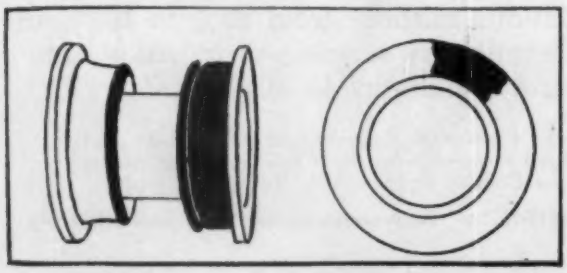


Fig. 4—Hard-facing a Caterpillar tractor roller, Sketches 1, 2 and 3

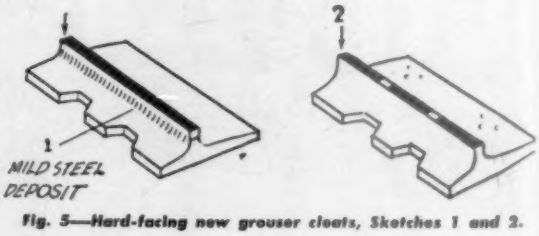
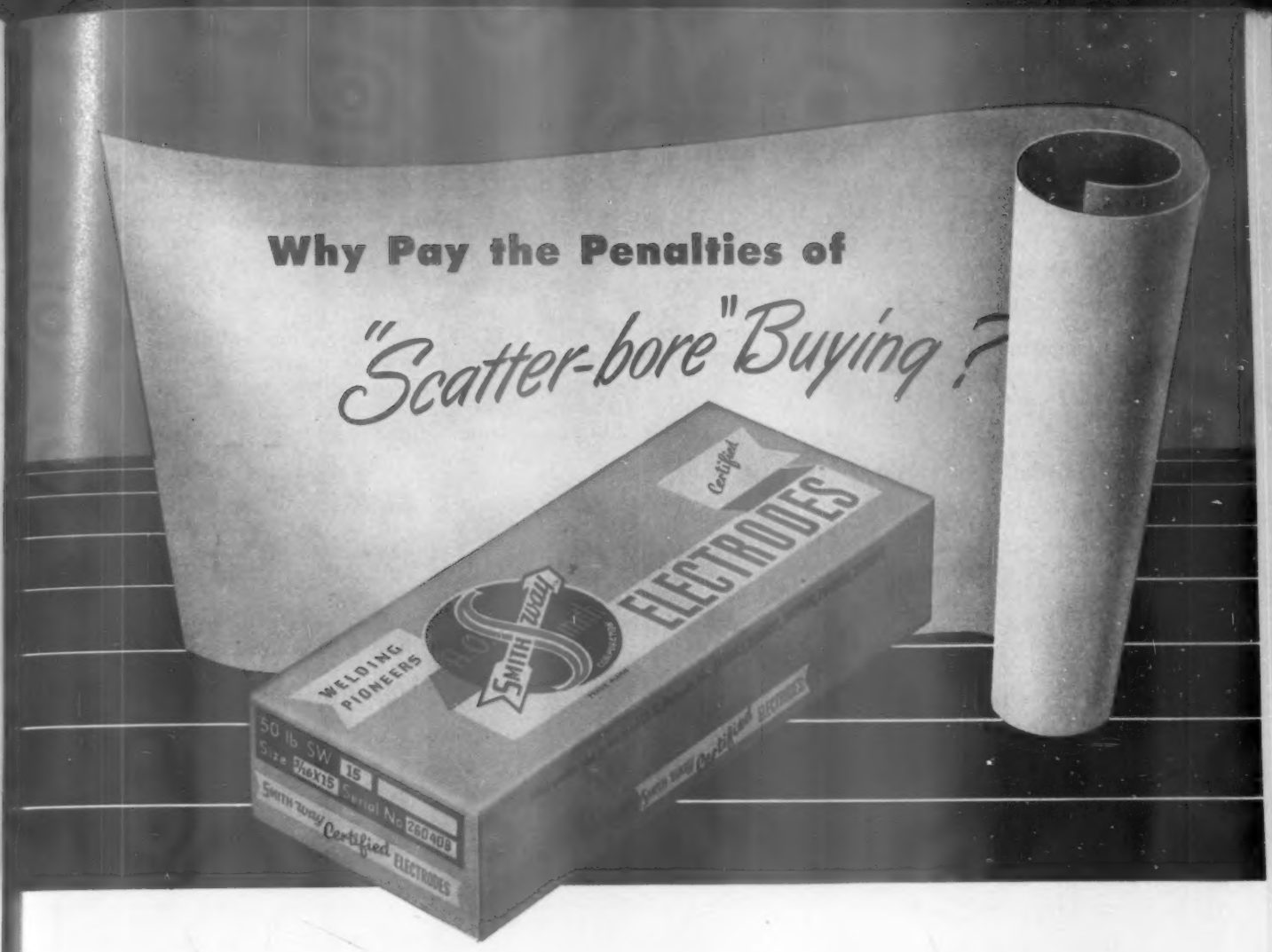


Fig. 5—Hard-facing new grouser cleats, Sketches 1 and 2.



For years it has been common practice among buyers of welding electrodes to purchase from several different sources. We can understand that—for we remember when it was necessary to buy one type of electrode from one supplier, another from another, and so on, in order to get the best electrode for each and every type of welding.

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illustrated in Sketch 1, Fig. 5, using ¼ in. coated Class I hard-facing rod. The danger of grousers breaking under severe operating conditions is minimized by allowing 1½ in. spaces between deposits as shown in Sketch 2, Fig. 5.

Bulldozer Tips

To obtain maximum service life from bulldozer tips, it is essential that the hard metal be applied to the corners and edges while the tip is still new. Hard-faced bulldozer tips last up to six times longer than those not protected.

Worn tips may also be hard-faced, but it is necessary that new corners made from scrap grader-blade steel be welded onto the bulldozer end (with coated mild steel electrodes) before the hard metal is applied.

Two lb of 3/16 in. coated Class I hard-facing rod were required for one bulldozer tip. This is another case where a small amount of hard metal multiplies the life of a much heavier wearing part (dozer tips weigh 25 to 40 lb, depending on size).

The proper procedure is to clean the area exposed to wear on grinder or buffer, and place the bulldozer tip in the flat position. The areas shown in Fig. 6 are then covered by applying 3/16 in. Class I hard-facing rods.

Dipper Fronts

The best way to make dipper fronts last is to hard-face them before they are put into service and to replace the hard metal as it wears away. Buckets thus protected will last months and even years. Worn buckets may also be hard-faced, but it is first necessary to replace the metal that has been worn away. This may be done by welding in sections of old grader blades, scrap manganese blades or by the addition of nickel-manganese rod deposits. Whatever the method, an overlay of coated Class I hard-facing rod should be applied after the bucket has been rebuilt to retard future wear.

Hard-facing provides the best means of keeping bucket lips in good repair. Because the hard-facing operation can be repeated many times, replacement lips are unnecessary.

Fifty lb of 3/16 in. coated Class I rod are required for a new 2½ yd dipper front.

The procedure (Fig. 7) is to hard-face the front of lip solidly with a single layer of Class I rod. Use the skip-and-jump method of welding to avoid overheating the manganese casting. Apply stringer beads behind the solid deposit, spacing the beads at intervals of approximately 1 in. Hard-face sides and bottom of lip in same manner. For best results, each rod should be peened while hot.

Shovel-Drive Tumblers

Drive tumblers are not hard-faced when new but are allowed to wear until they no longer operate efficiently. Worn areas are then filled in with steel electrodes, and a final layer of coated Class I rod is applied to reduce future wear. The rebuilding and hard-facing operation can be repeated as often as necessary.

Drive tumblers rebuilt and hard-faced as explained above will outlast the best new tumblers obtainable by 200% or more. The weight of weld metal and hard-facing rods required for the reconditioning operation represents but 15% of the weight of a new tumbler.

The rebuilding and hard-facing of two tumblers from a 2½ yd shovel requires 60 lb to 100 lb of 3/16 in.

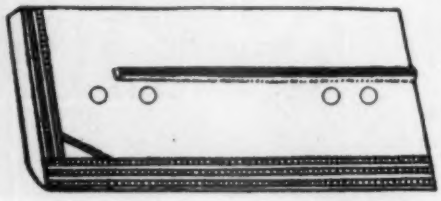


Fig. 6—Method of hard-facing bulldozer tip.

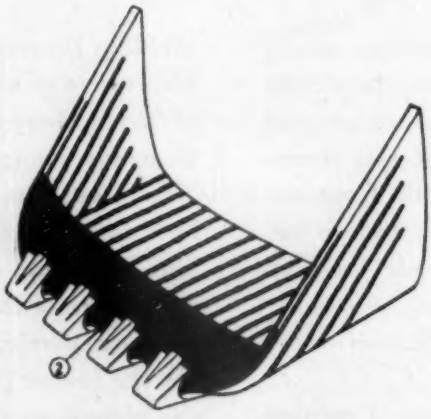


Fig. 7—Hard-faced dipper front: (2) Class I hard-facing.

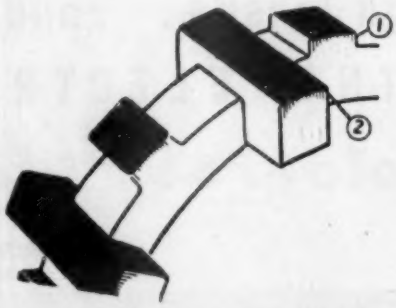


Fig. 8—Method of hard-facing shovel-driving tumbler: (1) High carbon steel deposit; (2) Class I hard-facing.

high carbon steel rods and 50 lb of 3/16 in. coated Class I hard-facing rod.

The procedure for rebuilding and hard-facing is shown in Fig. 8. Leave the tumbler assembled, blocking it up so it can be turned during the welding operation. Rebuild to original shape and within ⅛ in. of size with the high carbon steel electrodes, and finish with a final layer of coated Class I hard-facing rod. Use a template made from a new tumbler to obtain the proper dimensions.

Shovel Teeth

Hard-facing keeps shovel teeth sharp and extends their life two to five times over unprotected teeth, thus eliminating frequent changing of teeth and reducing the spare-parts inventory.

The proper way to protect any type of shovel tooth against abrasion is to hard-face wearing surfaces before the teeth are put into service. Abrasive materials are thus prevented from coming into contact with the parent metal. Worn teeth may be rebuilt, either by the addition of weld metal or by the use of steel bars, but the real economy results from hard-facing the new teeth before they are placed in service.

A tooth from a 2½ lb bucket will need one lb of 3/16 in., 20- to 30-mesh, Class IV hard-facing rod, and one lb of 3/16 in. coated Class I, hard-facing rod.

The procedure for hard-facing shovel teeth is shown in Fig. 9. Hard-face teeth on all four sides with Class IV (crushed tungsten carbide embedded in steel binder) hard-facing rod. The deposit should extend 2 in. upward from the point. Apply stringer beads with 3/16 in. coated Class I rod to the top sides of teeth. The spaces between the stringer beads should not exceed ½ in.

Shovel Crawler Pads

Shovel pads are not hard-faced when new but are usually operated until considerable play has developed between the drive tumbler and pads. Worn surfaces are then rebuilt with ordinary electrodes, and a final layer of hard-facing metal is applied to retard future wear.

Worn pads, costing $40 each and weighing over 100 lb, can be rebuilt in two to three hrs with only six to eight lb of metal. Furthermore, pads reconditioned and hard-faced by this method will outlast new pads 200%.

The rebuilding and hard-facing procedure (see Fig. 10) is to lay the track out flat and rebuild the pads to original shape and within ⅛ in. of

HELPING TO SOLVE TODAY'S WARTIME PRODUCTION PROBLEMS

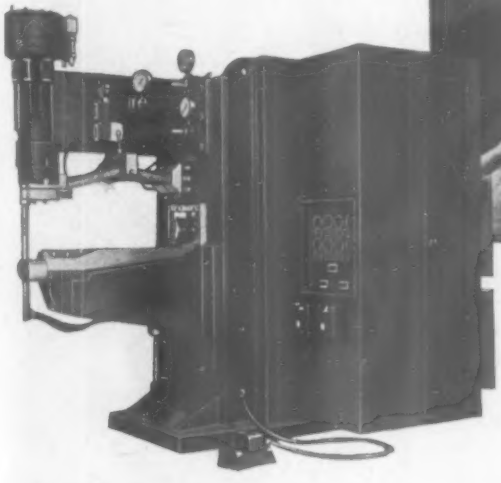
Critical Extrusion Problem Solved by Martin Engineers

. . . ON THE WORLD'S LARGEST SPOTWELDER

Faced with a severe shortage of extruded parts which threatened the production of Marauder bombers, Martin tool engineers found the answer in the *spotwelding* of heavy aluminum stampings. Parts such as tank door ribs, wing ribs, spars, longerons and fuselage formers are now built up from sheet metal parts in gauges hitherto thought impossible to spotweld.

The huge machine doing this job, has been designed and developed by Sciaky to weld up to two thicknesses of .187" aluminum. Features which have proved so successful in the welding of lighter gauges are employed. The tremendous power required (a flow of 100,000 amperes) is compensated for by the use of STORED ENERGY, which delivers instantaneous welding current without disturbing the plant's power system. Precise control of pressure is accomplished by the Sciaky patented VARIABLE PRESSURE CYCLE which regulates pressures up to 12,000 lbs. in an automatic sequence.

While this machine is being operated twenty hours per day on production, experiments are being conducted to prove its adaptability to steel armor plate, as well as other heavy aluminum parts.



TYPE PMCO5S-1 SCIAKY ELECTRIC RESISTANCE SPOTWELDER, 240 KW. Welding capacity: Aluminum and other alloys or corrosion resisting steels in thicknesses of from .040" minimum up to and including .187" maximum. Speed: 40 spot welds per minute on two thicknesses of .040" of light alloys

SCIAKY BROS.

Manufacturers of a Complete Line of
A.C. and D.C. Electric Resistance Welding Machines
4915 W. 67th Street, Chicago, 38, Illinois

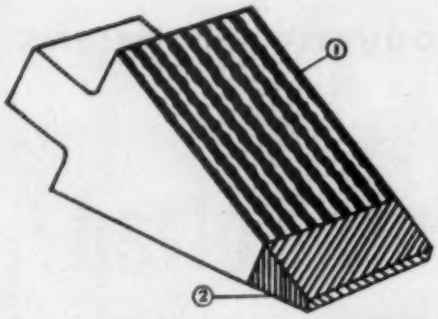


Fig. 9—Method of hard-facing shovel tooth: (1) Class I hard-facing rod: (2) Class IV hard facing rod (four sides).

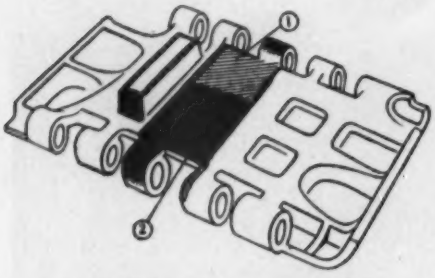


Fig. 10—Hard-facing shovel crawler pad: (1) High carbon steel deposit; (2) Class I hard-facing deposit.

Fig. 11—Lines show area of new sheepsfoot tamp to be hard-surfaced.

size. High carbon steel electrodes are used for this purpose. For the final layer, a coated Class I hard-facing rod is used. The deposit of each rod should be peened while still hot.

Carry-All Blades

Carry-all blades should be hard-faced while new. There are two or three types of metal that can be used for this purpose, but Class IV hard-facing rod, 20- to 30- mesh, is superior to others because it contains cast tungsten carbide (the hardest known alloy). Deposits of Class IV rod not only offer maximum resistance to wear, but also have the ability to cut hard earth formations.

Carry-all blades hard-faced with Class IV rod will outlast ordinary blades as much as six to one and maintain a sharp cutting edge as long as any of the hard alloy remains. The weight of Class IV rod required for the application is roughly 3% of the weight of an 8 foot scraper blade.

The blade is bolted to the carry-all, the welder adjusted for 150 to 175 amp, straight polarity, and the rod applied with a weaving motion. The deposit need not exceed 1½ in. in width.

Sheepsfoot Roller

Any type of sheepsfoot roller, whether movable or stationary, should be hard-faced before it is put into service. When the tamping area is reduced below regulation size, the tamp should be rebuilt with high carbon steel electrode and faced with a second deposit of Class I rod.

There are several cases on record where one application of hard-facing rod has prolonged tamp life 400%. Since the hard-facing application requires only ⅕ lb of hard metal and five minutes welding time, the savings in time and material over using ordinary tamps cannot be questioned.

Rebuilding and hard-facing requires the following materials per tamp:

Worn tamps: ½ lb of $\frac{3}{16}$ in. high carbon steel electrodes and ⅕ lb of $\frac{3}{16}$ in. coated Class I hard-facing rod.

New tamps: ⅕ lb of $\frac{3}{16}$ in. coated Class I hard-facing rod.

For removable worn sheepsfoot tamps, build a fixture so that the tamps can be slipped into position and rebuilt to size against a copper form. The rebuilding is done with high carbon steel electrodes. When the tamp has been built up to size, a single layer of Class I hard-facing rod is applied. If the tamps are stationary, the entire roller must be blocked up so that it can be turned.

To hard-face new sheepsfoot tamps, simply cover the areas shown in Fig. 11, making sure that the corners and edges of each tamp are well covered.

Grader Blades

A grader blade hard-faced with Class IV rod will retain a sharp cutting edge and outlast ordinary steel blades up to seven times. Six ounces of $\frac{3}{16}$ in., 20- to 30-mesh, Class IV rod will give a foot of deposit 2 in. wide.

Most grader blades are made of high carbon steel and are heat-treated. If hard-faced in the heat-treated condition, they are likely to break if subjected to impact. For this reason, it is advisable to anneal these blades before hard-facing and to keep them hot while the hard-facing rod is being applied.

When hard-facing, two blades are bolted back to back. The machine should be adjusted for 150 to 175 amp, straight polarity, and the deposit should not extend more than 2 in. from the edge. When the application is finished, the blade is allowed to cool in still air.

Scarifier Teeth

Scarifier teeth hard-faced with Class IV rod will stay sharp 30 to 40 times longer than unprotected teeth. The hard-facing application can be repeated four or five times before the tooth becomes too short for further service.

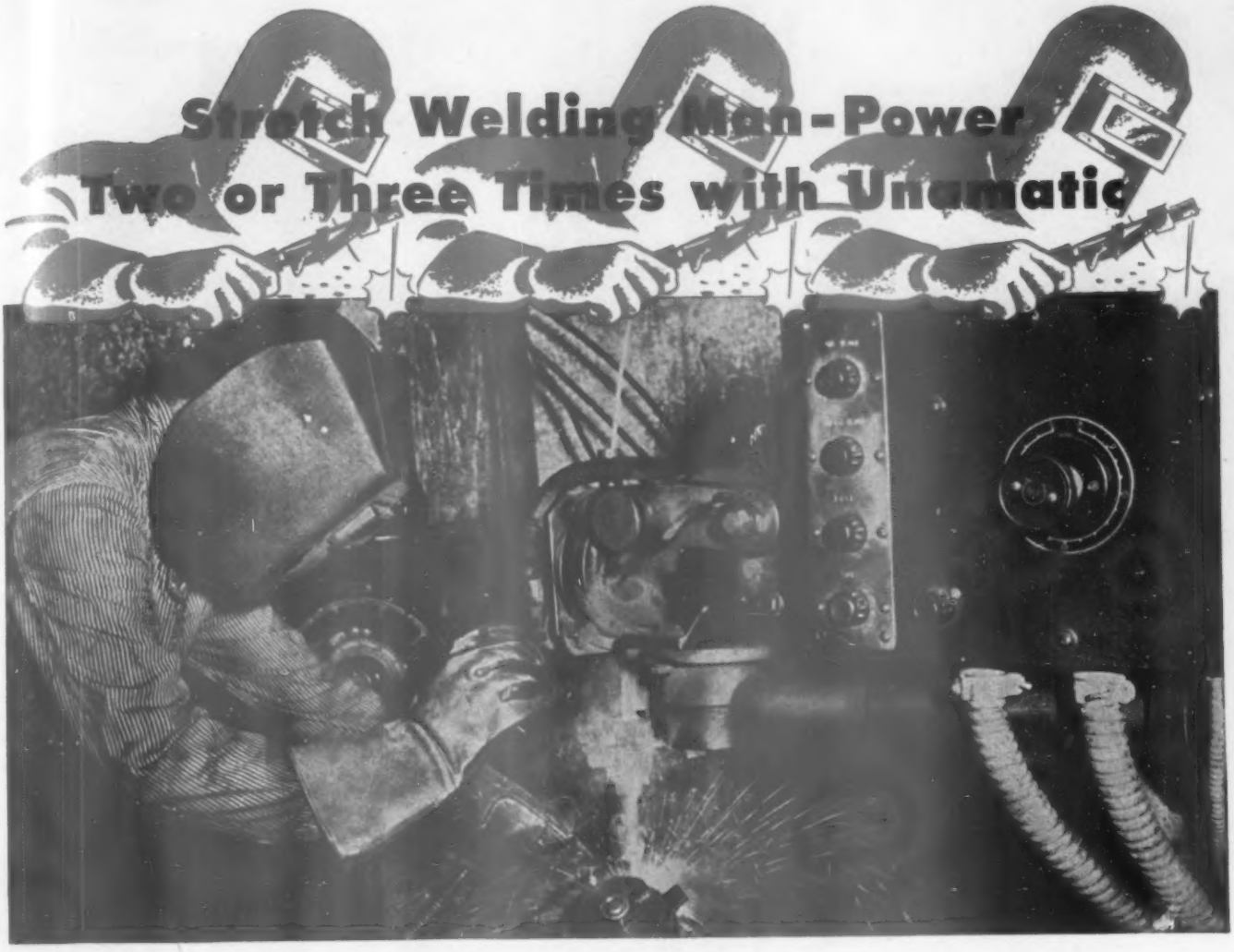
Either a new or worn scarifier tooth may be hard-faced. The worn tooth, needless to say, must be sharpened before the hard-facing layer is applied, and the top side of the point should be cleaned on a buffer or grinding wheel to remove oxides.

Twenty-five teeth, 1 in. wide, can be hard-faced with one lb of $\frac{3}{16}$ in., 20- to 30-mesh, Class IV rod. The teeth are propped against bricks to insure that the area to be hard-faced will be level. The deposit need not extend more than 2 in. upward from the point and should not exceed more than ⅛ in. in thickness; it may be as thin as $\frac{1}{16}$ in. Where subsequent heat treatment is necessary, the teeth should be quenched in oil, not water.

THE END

Hard-faced dipper tooth for a quarry shovel. A ferrous alloy was used because of its resistance to impact.

Stretch Welding Man-Power Two or Three Times with Unamatic



DOUBLE or triple your welding output even with your reduced available man-power, improve quality, lessen rejects and increase your war production now by installing Unamatic equipment immediately. With a nucleus of experienced manual welders as foremen-operators additional Unamatic equipment can, in many cases, be operated by men or women who are not of the highest skill. In the awarding of new contracts, companies which get out the most production per man hour will be given most consideration.

Unamatic welding is two, three or even four times as fast as manual operation on shielded arc work — and even faster using light coated wire. If you are welding now you are eligible with W.P.B. to buy new Unamatic equipment by switching your present welders to automatic production.

Wider use of Unamatic equipment is the most practical, immediate and obvious remedy for the critical shortage of man-power in welding. Don't wait — get all the facts and any engineering help you need right now. Wire or write today.

CONTROLLED QUALITY

UNAMATIC WELDING

CONTINUOUS PRODUCTION

UNA WELDING INC. • 1615 COLLAMER AVE. • CLEVELAND, OHIO

The National Metal Congress and War Conference Display, October 18-22, will be located in 278 rooms on the 7th, 8th, and 9th floors of the Palmer House, Chicago. Some 160 manufacturers in the metal field will be prepared to tell visitors the story of their products.

National Metal Congress

Chicago will be the scene of the National Metal Congress and War Conference Display in 1943. Sessions on production, conservation and postwar planning feature the technical program.

A SERIES of 17 technical sessions on production, conservation and postwar planning in the metal industry will be the highlight of the National Metal Congress and War Conference Display in the Palmer House, Chicago, the week of October 18. The theme of the 25th Annual Metal Congress and Exposition will be directed towards postwar thinking and will be far different than any previous edition of this history-making metal event. The keynotes of this year's meeting will be those of increasing production, conserving material and planning for the postwar era.

The doors of the exposition will open at 12 noon Monday, October 18, and will remain open every afternoon and evening until 10:30 with the exception of Thursday evening. On Thursday evening, the exposition will close at 6 o'clock to allow the visitors to attend the annual banquets of the various societies which are meeting in conjunction with the Metal Congress.

Admission to the War Conference Display will be free to all members of the technical societies participating and to those holding executive passes.

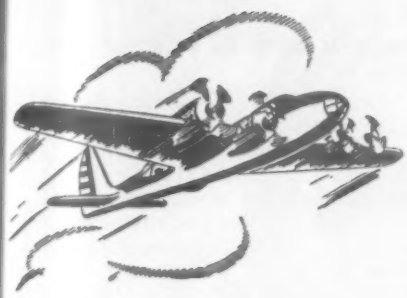
War Production Sessions

Seventeen War Production Sessions are also being held at the Palmer House as a part of the War Conference Display; they will be held each afternoon and evening during the week with the exception of Thursday and Friday evenings. These sessions will be launched on Monday afternoon, October 18, with a discussion of advanced quenching practice. The problem of proper quenching has assumed real significance during the war because such armament as armor plate and armor piercing shot depends upon correct quenching practices to achieve top hardness and toughness.

Monday evening will be devoted to simultaneous sessions, of which one will hold considerable interest to welding men. This is the session devoted to non-destructive testing, which includes inspection of rough material, appraisal of surface finishes, X-ray inspection and interpretation of magnetic inspection methods.

NE Steel Discussion

Among other sessions which will be of interest to those in the welding industry will be a session devoted to National Emergency Steels, on Wednesday evening, October 20. The uses of these new steels in aircraft and engines as well as their general utility will be discussed, and a look will be taken at the postwar prospects of these leaner alloy steels. Salvaging of metal, including the recovery of battlefield scrap, will be covered in one of the simultaneous sessions on Thursday afternoon, October 21. The use of aluminum and brass cartridge scrap and the saving and disposal of steel tool scrap (including grinding) are also slated for discussion at this Thursday session.



Exhibits

The War Conference Display will be located in 278 rooms on the seventh, eighth and ninth floors of the Palmer House. In these rooms, some 160 manufacturers will be prepared to tell visitors of their products through lightweight models, moving pictures and small items of equipment. Many manufacturers, because of inability to display their regular lines of heavy equipment, have turned to photographs and will use these to show items which have been responsible for both increased war production and conservation in the metal industry. In these many conference rooms, executives and engineers of various manufacturers in the several branches of the metal field can meet for informal discussion that will help to solve the problems today confronting them.

The War Conference Display and the activities of the four participating societies will bring together outstanding authorities on manufacture, production and fabrication. Because of this intense concentration of the knowledge of thousands of technical and production wizards, a trip to Chicago will be well worthwhile for everyone engaged in war production.

Following is a list of the exhibitors who will be of particular interest to those in the welding industry:

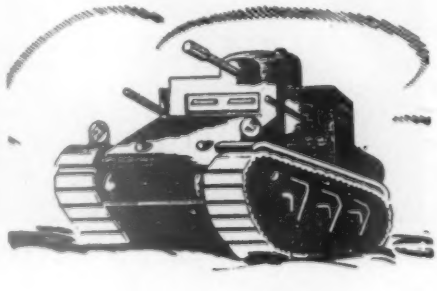
EXHIBITORS

Company	Room
A	
Ajax Electric Co., Inc.	801
Aluminum Co. of America	705 & 731
American Allsafe Co.	814
The American Brass Co.	836 & 838
American Chain & Cable Co.	729
American Magnesium Corp.	705 & 731
Ampco Metal, Inc.	946W
B	
Baldwin Southwark Div.	828
Bastian-Blessing Co.	830
Bausch & Lomb Optical Co.	706
C	
Canadian Radium & Uranium Corp.	717
Central Scientific Co.	775
C (continued)	
Chicago Flexible Shaft Co.	761
Coffing Hoist Co.	943
Conco Engineering Works	708
Crown Rheostat & Supply Co.	806
Continental Machines, Inc.	833 & 834
D	
A. P. De Sanno & Son, Inc.	777
Dravo Corp.	960
The Drever Co.	760
Allen B. DuMont Labs. Inc.	841 & 842
Do-All Midwest Co.	833 & 834
E	
Eutectic Welding Alloys, Inc.	711
F	
Firth Sterling Steel Co.	831 & 832
G	
General Electric X-Ray Corp.	728
Girdler Corp.	733
Claud S. Gordon Co.	703
H	
H & H Research Co.	802
Handy & Harman	744
Harnischfeger Corp.	813
Hevi Duty Electric Co.	759
I	
Illinois Testing Labs. Inc.	757
Independent Pneumatic Tool Co.	726
Indium Corp. of America	835
Induction Heating Corp.	860
International Nickel Co.	886
J	
C. Walker Jones Co.	907
K	
Kelley-Koett Mfg. Co.	829
Krembs & Co.	755
L	
Lepel High Frequency Labs.	763
Lukens Steel Co.	732
Lukenweld, Inc.	732
M	
Magnaflux Corp.	745
Marquette Mfg. Co.	856
Metallizing Co. of America	903W
Mine Safety Appliances Co.	720
Molybdenum Corp. of America	776
N	
National Engineering Co.	816
O	
Ohio Carbon Co.	775
P	
Page Steel & Wire Div., American Chain & Cable Co.	729
Pangborn Corp.	961W
Picker X-Ray Corp.	715 & 716
R	
Radium Chemical Co.	857
Ransome Machinery Co.	876
Reynolds Metals Co.	907W
Riehle Testing Machine Div.	848
Rustless Iron & Steel Corp.	804
Joseph T. Ryerson & Son, Inc.	786
S	
George Scherr Co.	959W
T	
Tempil Corp.	812
Torit Mfg. Co.	802
Tube Turns, Inc.	733
U	
Upton Electric Furnace Div.	912
W	
Welding Apparatus Co.	966W
The Welding Engineer	819
Welding Engineering Co.	808
Westinghouse Electric & Mfg. Co.	750 & 751 & 752
Wall-Colmonoy Corp.	964W

Ode of an Electrode

By **W. F. SCHAPHORST**

We're merely electrodes, we humbly admit,
But nevertheless we are doing our bit.
Good weldors rely on our strength and our grip
For safeguarding cannon, tank, airplane and ship.
Without us, you never will get anywhere;
So please, Mister Weldor, conserve us with care.
In storage, insist that we're always kept dry,
Up off the damp floor, on a shelf amply high.
Beware sweating pipes, open windows and such;
We sometimes get rusted by moisture's least touch.
If through some mishap we should chance to get wet,
Just spread us out quickly. And please don't forget
That we do our best work when we are not bent.
And fit all joints properly 'ere you consent
To do any welding, and then, for best strength,
Make legs of all fillet welds equal in length.
And do make the face of all fillet welds flat.
Since we're growing scarcer, it's now urgent that.
To win in this conflict with guns, planes and subs,
We're utilized down to the tiniest stubs.
Produce everlastingly! Use us! Don't cease!
We'll then win the war and the right kind of peace.



On the Job

Helium-Shielded Arc Welding

BOTH manual and automatic arc welding equipment have been experimentally developed by the General Electric Co. for the welding of magnesium and magnesium alloys under a protective shield of helium gas. The equipment has not yet been produced for sale to other companies—a step that is doubtless intended in the near future. Its development is said to be based on research work done by G-E engineers H. M. Hobart and P. K. Devers, who discovered some years ago that fusion welding could be done in atmospheres of helium and argon using tungsten and carbon electrodes.

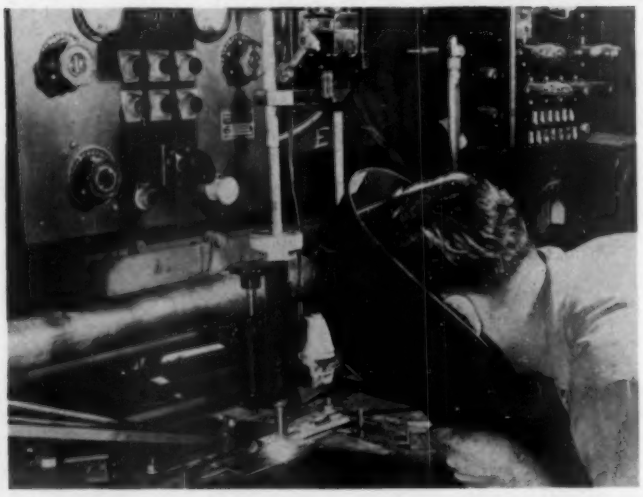


Fig. 1—Automatic helium-shielded arc welding equipment in operation. The slanting tube at lower left directs the filler wire into the arc and the vertical rod carries the tungsten electrode and gas nozzle perpendicular to the work. All operations are controlled by the panel at upper left.

A standard D-C welder is used as the source of power for both manual and automatic magnesium welding. The automatic unit, Fig. 1, makes a smooth, clean weld under a shield of helium gas at rates up to 40 in. per minute (on ⅛ in. stock). Fig. 2 shows a close-up of the operation.

The unit now in use at the G-E welding laboratory incorporates an electronic control (panel at upper right in Fig. 1), enabling the equipment to hold the proper arc length even when the arc is climbing or descending inclines. The filler metal (magnesium) is unreeled and fed to the work at the correct angle through a slanted nozzle rod, while the tungsten electrode and gas nozzle are carried perpendicular to the work.

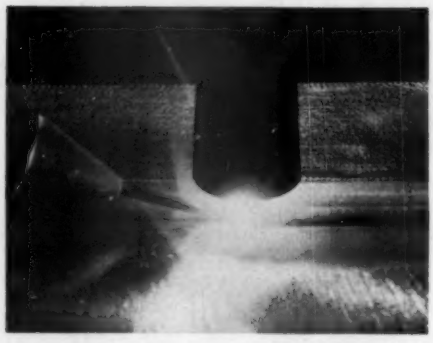


Fig. 2—A close-up of the welding of magnesium plate with the equipment in Fig. 1. Accurate control of the rate at which the filler wire is fed into the arc zone (through the tube at left) produces the uniform bead contour shown on the right. The nozzle above the arc surrounds the molten metal with an envelope of inert helium gas.

The rate at which filler metal is fed can be adjusted to a constant uniform speed, or a supplementary control can be used to feed the wire on a predetermined cycle. All operations are controlled by the panel shown at upper left of Fig. 1.

» «

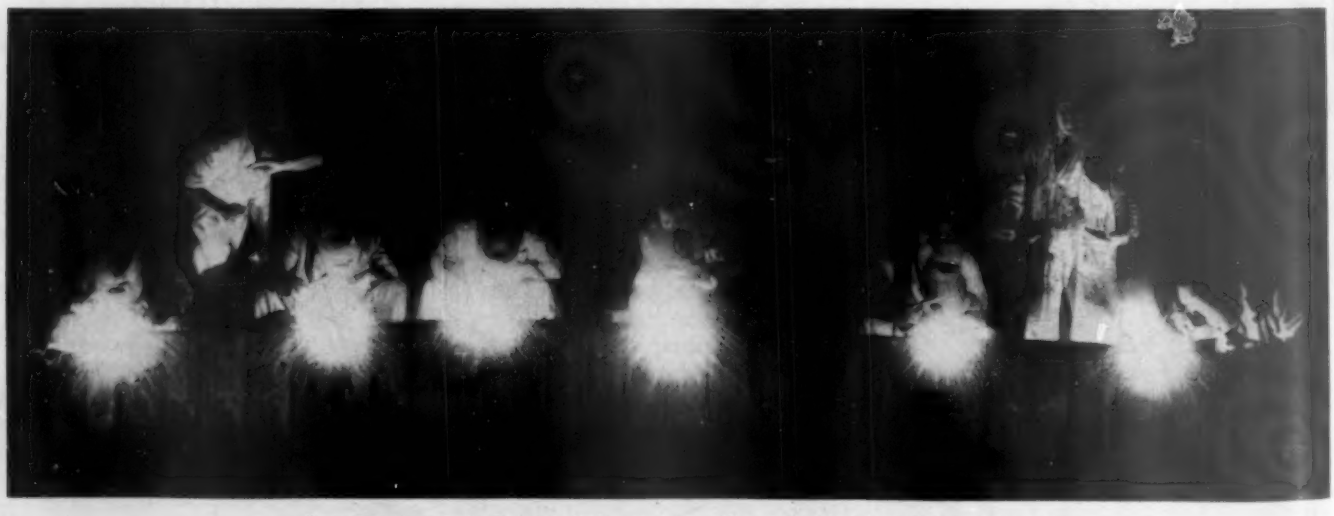
Welding in Brazil

BESIDES being the home of the *samba*, Brazil has the largest iron ore reserves of any nation and is surely destined to be one of the great industrial countries of the world in the not-too-distant future. A good start toward Brazilian industrialization has already been made in the fast-growing metropolis of São Paulo—often referred to as the "Chicago of Brazil."

Through the kindness of Senhor Ernesto Trivellato, proprietor and general manager of a welding establishment in São Paulo, we are enabled to reproduce the accompanying picture as evidence of what is being accomplished in the welding field by our neighbors south of the equator. The photograph shows the reconditioning of a Caterpillar tractor track, done at night—in view of the emergency—within four hours by six weldors working together.

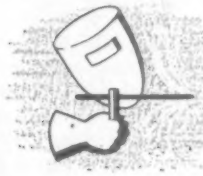
Senhor Trivellato's shop specializes in the reconditioning of Caterpillar tractor parts, front wheels, idler wheels, track links, cleats, etc. and in the assembling and welding of tanks. Hard-facing is done on crusher jaws. Welded repairs are made on auto chassis, tops, motors and axles; also on boilers and pressure vessels.

The company has machines ranging in capacity from 17 to 500 amp, which it will rent (with the weldor) if the customer desires. Welding is done on iron, aluminum, cast iron, stainless steel, manganese and other steels, copper, brass and other alloys.



Emergency tractor track repair in Brazil. Six weldors completed the job in four hours.

PAGE *Welding* ELECTRODES



Of course PAGE developed a new electrode for welding armor . . . Important as that may have been to tank production, it is just as vital—to those who weld Stainless Steel—that PAGE also developed a *complete* range of electrodes for this purpose. In fact, no matter what Stainless Steel you are welding, PAGE can supply you with electrodes that deposit, in the weld, metal that equals the Stainless you are using. That is something worth checking into with PAGE.

PAGE STEEL AND WIRE DIVISION

Monessen, Pa., Atlanta, Chicago, Denver, Los Angeles, New York, Pittsburgh, San Francisco, Portland

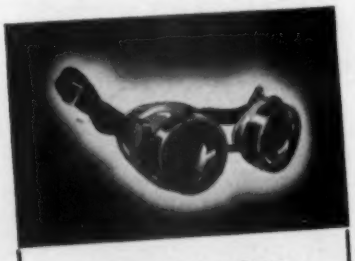
AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT • CONNECTICUT

ESSENTIAL PRODUCTS . . . TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, Yacht Rigging, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

Does a riveter, chipper, welder or chemical worker, busy at his job, care that in the manufacture of Willson protective lenses we discard tons and tons of glass every year? Perhaps he hasn't given it a thought, but Willson throws away glass which the worker's own eyes would say was perfect...the flaws of which only delicate scientific machines can detect. Such rigid inspection may save that worker's eyes some day—and actually increases his efficiency *every* day.

All Willson protection is *scientifically engineered*. That is why so many Safety Directors and Purchasing Agents specify "Willson or equivalent" for all kinds of head, eye and lung protective equipment. For 73 years Willson has set the standard.



Willson Heavy-Duty Cup Goggles, RW50

Composition cups for use in "hot" jobs, where humidity and lens-fogging are problems. Unusual amount of ventilation. 50 mm. clear Super-Tough lenses.

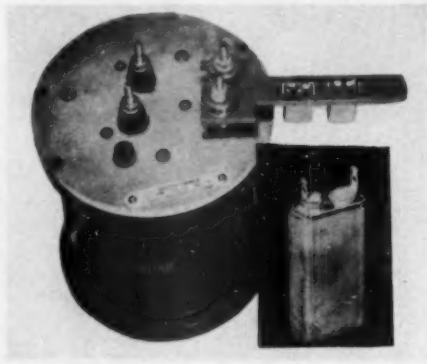
GOGGLES • GAS MASKS • HELMETS • RESPIRATORS

WILLSON DOUBLE

PRODUCTS INCORPORATED
READING PA U.S.A.

Induction Heating Cuts Time

THE SOLDERING of covers on condenser cans formerly took 16 minutes, but this time was reduced to 2½ *seconds* through the application of induction heating. Furthermore, unskilled labor could be used instead of an experienced operator skilled in use of the soldering iron.



Courtesy, Induction Heating Corp.

Work coil with energizing transformer. Though only two condensers are shown in this coil, a special fixture holding eight condensers can be placed in each coil position.

The cans and covers are assembled, fluxed and placed in a fixture which holds eight cans. A ring of solder of the proper specifications is preplaced over the section to be joined. The fixture is now raised to a position which brings the joint area in proper relation to the copper work coil, which is positioned directly above the fixture.

When large production is required, a two-position coil set-up is used, with eight cans in each coil. While one position is heating and cooling, the other position is being loaded with condensers to be soldered.

The thermionic induction generator is energized by pressing the start button, and heat is immediately evolved in the joint section. At the end of the predetermined period of 2½ seconds, a timer automatically shuts off the power. When the joint cools, the work is lifted from the fixture fully soldered.

The specially designed high-frequency transformer used in this application operates at a terminal voltage across the coil of approximately 200 volts. The work coil is made up of copper bar stock and machined to provide holes slightly larger than the object to be heated.

» «

Blind Date with a Convoy

"PRESSURE vessels required for Russian program. This project greatest urgency and top priority. Extremely important to war program you accept these orders and ship on required dates, even though this delays other work."

The above message from the War Production Board was a challenge to Works Manager Bill Hindman, of the Milton plant of American Car and Foundry Co., and his staff. Though the bubble towers involved were units larger than any the company had ever built, Bill Hindman knew that Russia needed them badly for the rehabilitation of her oil industry in reoccupied but Nazi-devastated areas. "We'll do the job or break a leg," he said.

The blind date with a convoy was kept, the five heavyweight units being completed within less than five weeks—ahead of schedule dates. The largest bubble tower was 105 ft high, 10 ft 6 in. in diam and weighed 50 tons. As the bottom picture shows, two flatcars were needed to transport each one of these huge towers to the convoy.

This big job could not have been accomplished without automatic welding. The bubble towers were constructed by means of a technique developed by the Milton plant during the past few years for application of the automatic submerged melt welding process to ICC 105 Class tank cars. The welds were made under a protective layer of granulated and molten material of special composition and allowed to solidify while still protected. Thus oxidation was completely avoided, and the resulting welds had unusual strength, ductility, shock resistance, uniformity, density, low nitrogen content and corrosion resistance.

Another advantage of the A-C-F technique is that it is able to hold the "big shell circumferences" to close tolerances. This is necessary in order to make possible the close tolerance application of the inside mechanism in the bubble tower.

Five of these large bubble towers were constructed in as many weeks for shipment to Soviet Russia.

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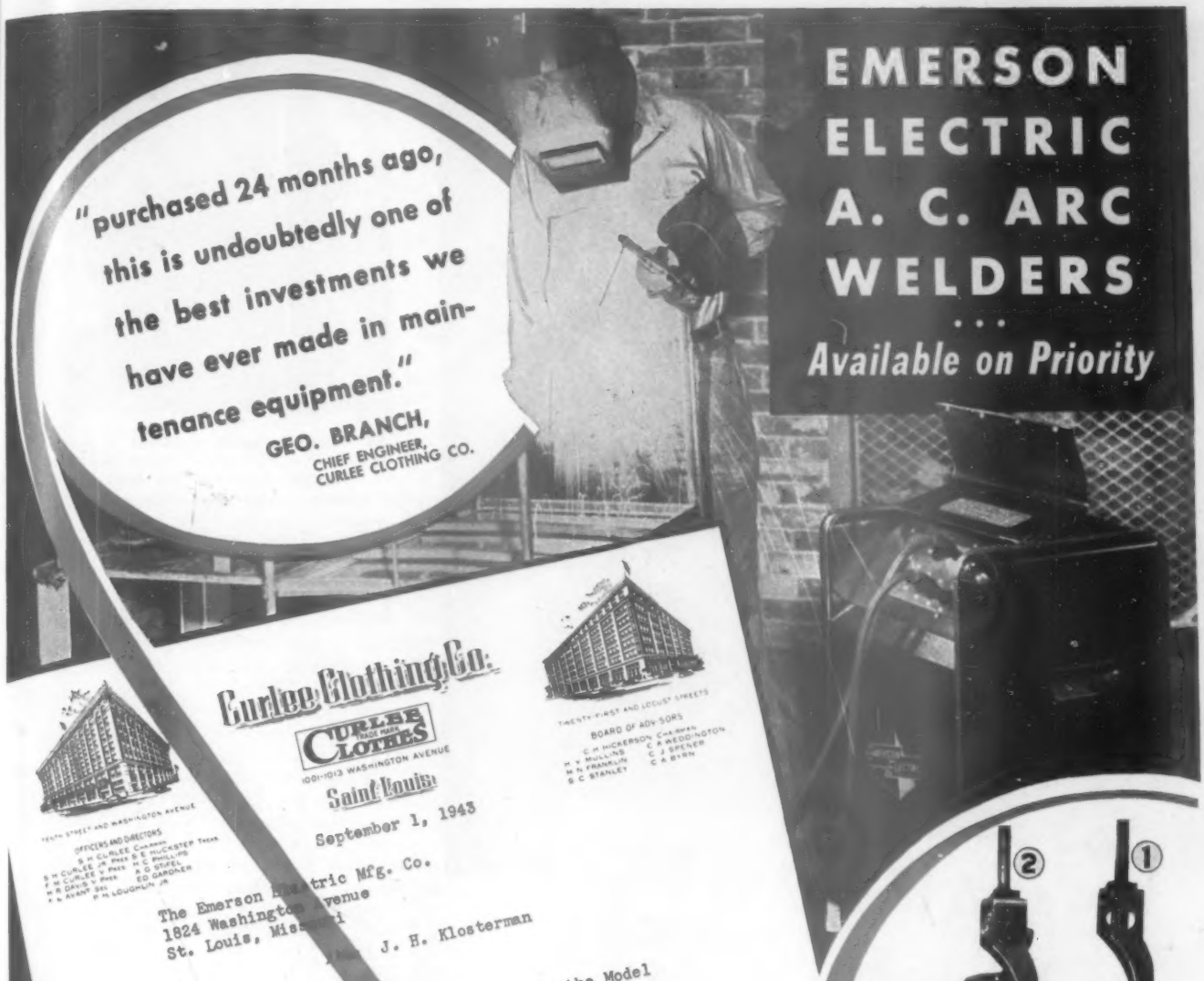
. . .

Available on Priority

"purchased 24 months ago, this is undoubtedly one of the best investments we have ever made in maintenance equipment."

GEO. BRANCH,
CHIEF ENGINEER,
CURLEE CLOTHING CO.



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September 1, 1943

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Attn: J. H. Klosterman

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In reply to your inquiry about the Model 200 Emerson-Electric A. C. Arc Welder which we purchased 24 months ago, this is undoubtedly one of the best investments we have ever made in maintenance equipment.

We have used the machine for welding many different jobs, of which I shall mention only a few: Cat walk and metal ladder in our boiler room, repairing machines, repairing clothing racks and stands, numerous maintenance jobs both on interior and exterior of the building and last but not least an extremely delicate precision job of welding broken sewing machine thread guides of which I am sending you a sample.

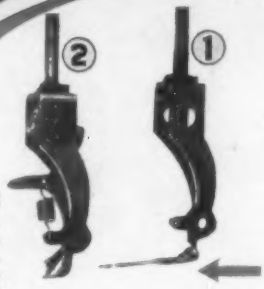
We feel that this machine has already paid for itself many times over. With no moving parts to wear or give trouble, I don't see how we can ever wear it out. We recommend the Emerson-Electric Welder highly.

Very truly yours,

CURLEE CLOTHING CO.

Geo. Branch

G. Branch, Chief Engineer



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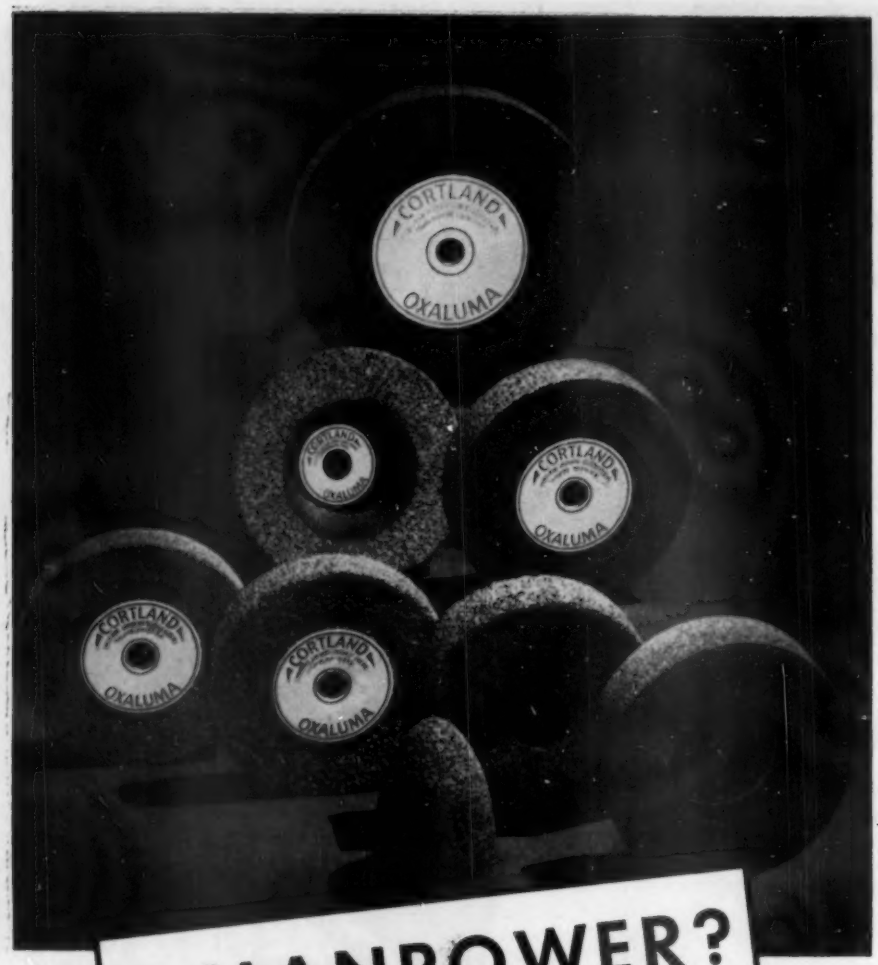

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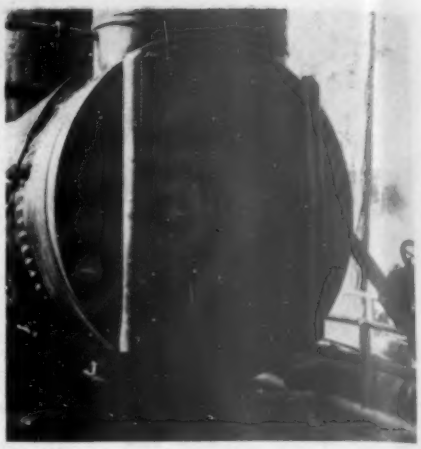


To protect the smoke-box door of a boiler, these buffer bars were welded just outside the handles. Note that the four ends rest against the outer edge of the boiler shell.

Buffer Bars for Boiler

By CHARLES C. LYNDE

THE portable boilers used for oil-field service are usually moved by having the fire-box end supported on a trailer while the smoke-box end rests on the bed of the truck providing the motive power. While the truck is on the move, the comparatively light smoke-box cover is apt to be bumped and dented.

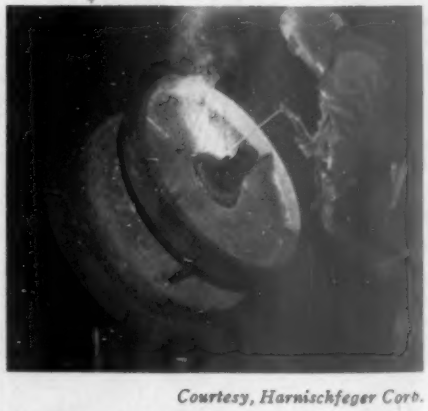
To safeguard the smoke-box cover, the weldor for one drilling contractor made the two buffer bars shown here. Cut from extra heavy 2½ in. pipe, the bars were placed so that they would rest against the outer edge of the smoke-box boiler shell and thus transmit to the heavy plate all of the thrusts which would otherwise be directed against the cover.

The bars are not in the way for maintenance or cleaning, and they extend greatly the useful life of the boiler end.

» «

Welded Drum Spiders

BIG SPIDERS for hoisting drums may be readily fabricated by arc welding, reports Weldor Cliff Sundeen. The rims are of 5 by 1 in. 1040 steel, and the 8½ in. hubs are formed from 1035 steel. The webs, of ⅜ in. and ⅝ in. structural steel, are plug welded together. Low alloy electrodes are used on the deep seams and mild steel all-position electrodes elsewhere.



Courtesy, Harnischfeger Corp.

Rims, hubs and webs are joined by arc welding to make this large spider for a hoisting drum. Note the plug welds on the inside of the web.

Fast Cutting Wheels

for Every Weld Grinding Job

YOU need fast cutting action to quickly remove the excess metal at the weld—you need smooth surface for the subsequent finishing operations. Norton grinding wheels have been scientifically developed to provide both and there are sizes and shapes of Norton wheels in the right grains and grades for all kinds of weld grinding.

STRAIGHT WHEELS—Usually 6" or 8" diameter and from ¼" to 2" thick. For the thinner wheels 20 grain and a coarser grit—24—for the thicker wheels. The most common hardness is P4T or Q4T-H Alundum resinoid for carbon and alloy steels.

CUP WHEELS—Probably the most popular sizes are flaring cups (6-4½") x 2" x ⅝" with a 1" rim and straight cups 6" x 1½" x ⅝" with a 2" rim. They are available with ⅝" holes or mounted on ⅝" threaded steel bushings. For general work, the wheel specification is usually 16 or 20 grit, grade P4T Alundum resinoid.

CONE WHEELS—Cone wheels are mostly used for grinding welds in holes and for other hard-to-get-at places. One of the most common sizes is 2¾" x 3½" with ⅝" threaded hole, 24 grit Q4T-L Alundum resinoid.

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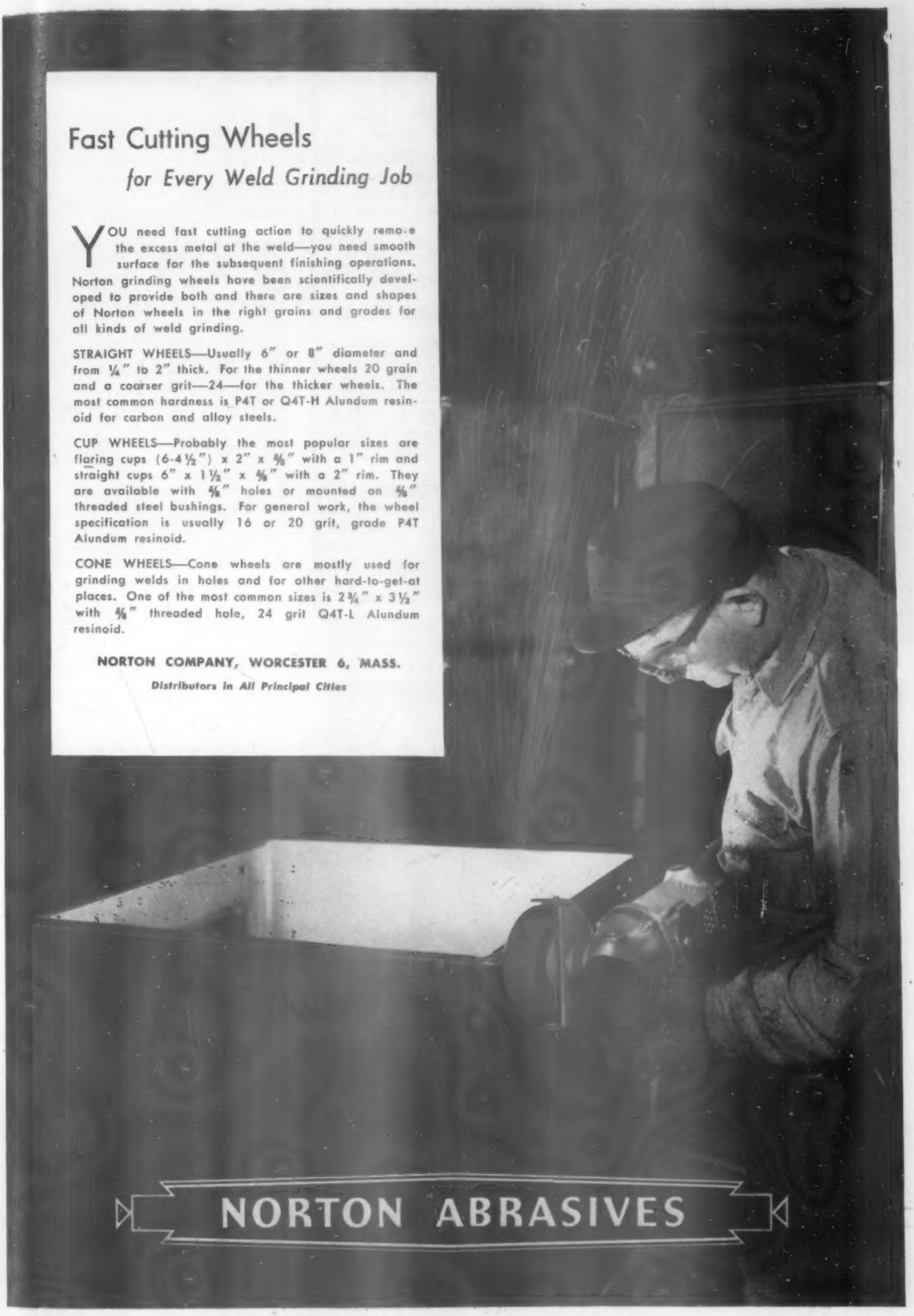

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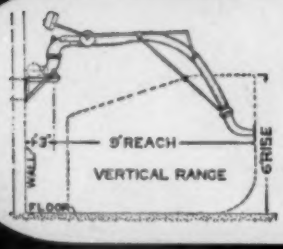

GUARD EMPLOYEE HEALTH by installing Ruemelin Fume Collectors wherever welding operations take place. They remove noxious gases, heat and smoke at the source . . . eliminate employee fatigue . . . speed up welding operations. Especially valuable in winter when doors and windows must be closed. Hundreds in operation all over the country. Write for bulletin No. 37-C.

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RUEMELIN FUME COLLECTOR

Showcases to Ship Ventilators

By W. A. PRUETT
Research Engineer, Weber Showcase and Fixture Co.

ONE WOULD hardly think of a showcase manufacturing company changing over to cowl ventilators for Liberty ships, but that is exactly what Weber Showcase and Fixture Co., Los Angeles, has done to aid in the war effort. Our job is to stamp, weld and finish over 20,000 cowl ventilators for the hundreds of 10,000-ton Liberty ships being constructed in shipyards from Washington to Maine and to do the job faster than it has ever been done before.

Courtesy, The Hobart Brothers Co.

A reinforcing ring formed from a slotted pipe is welded to the Liberty ship funnel.

A swift and sure method of producing these ventilators was our first and most important problem. We designed and built (completely by arc welding) what we believe to be the world's largest deep drawing press. This press weighs 250 tons, stands four stories high, and embodies features that have never been incorporated in a die stamping press before. When forgings for the four corner posts were not available, we turned to arc welding and eliminated the need for forgings by using H-beams of structural steel.

Welding also plays an important part in the actual construction of the ventilators. Formerly, ventilators were formed by the "Lobsterback" method, involving riveting which eventually weakens the structure because of rusting of the rivets. In our ventilators, there is no riveting and the welds are as strong as the sheet itself.

After the blanks have been cut and drawn, the two halves of the ventilator are arc welded together; bottom and face are then trimmed, and collars are rolled and welded for the vent. Here, again, a little experimentation revealed we could shortcut the more obvious process of using slotted pipe. We constructed a series of roller dies which would form 11-gauge steel ribbons into the desired shape. Six sets of rolls driving from the same gearing progressively squeeze the steel ribbon into pipe with a ⅜ in. slot. We then have a straight pipe, to be rolled and arc welded into a cir-

CONNECTING AMERICA'S WELDING CABLES

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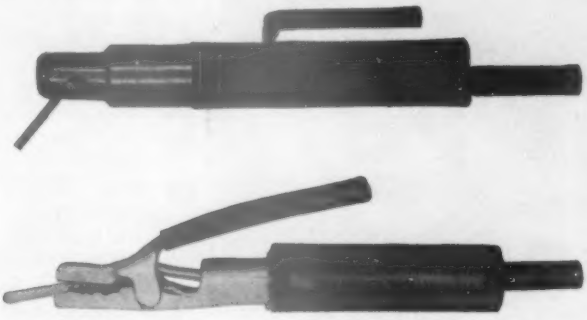

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Hol-Grip Jr.	150 AMP
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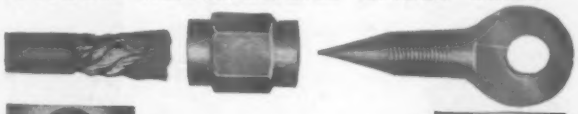
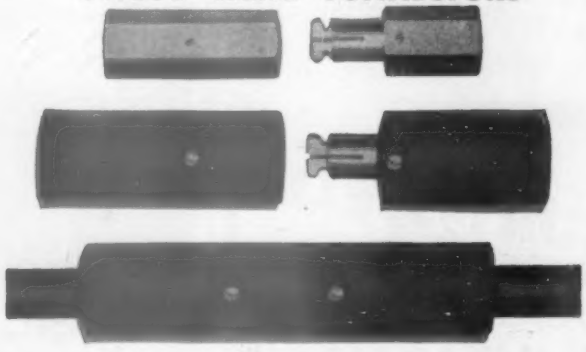


OPEN TYPE

SHOWS ASSEMBLY
INSERT CABLE STRANDS,
TURN SCREW INTO
NUT HELD STATIONARY

HOLE TYPE

TWECO CABLE CONNECTORS



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cle (causing the slot to close). The welded ring is next rolled over a tooth in order to open the slot once more. The strengthening ring is now driven with a hammer slotwise over the edge of the ventilator and arc welded into place. This yields an excellent joint. Any remaining cracks and crevices are filled with hot zinc during galvanizing.

A band of steel measuring ½ by 2 in. is now rolled and welded closed, then slipped over the sleeve of the funnel and arc welded. This band not only strengthens the structure as a whole, but readies the sleeve for attachment to the funnel proper at a later time. Welding the vent to the funnel may take place either in our plant or at the shipyard—the former practice generally prevailing.

When the funnel is completed, we grind the weld bead and sandblast preparatory to galvanizing. Finally, we install screens, which serve the dual purpose of collecting debris and breaking the force of water when the ships are plowing through heavy seas. These welded ventilators are built to withstand the roughest usage.

We are making five sizes of round funnels, from 10 in. to 24 in. out of 16-gauge cold rolled steel and 24 in. and 30 in. ovals and 36 in. round funnels of 14-gauge. We believe we are contributing an important bit to construction of Liberty ships, since ventilators are vital to the successful operation of the Liberty fleet.

» «

Artist Turns Weldor

IN PREWAR days, Miss Beatrice Ely Wose of Syracuse, N. Y., won a reputation for her use of paintbrush and palette; now she is equally skilled with the welding torch. Miss Wose is a well known artist, whose paintings are currently on exhibition at the Museum of Fine Arts, Syracuse.

Painter Beatrice Ely Wose is equally an artist with the welding torch. Her new work is brazing spacers on the end of a heat distributing tube used in unit heaters made by Carrier Corp.

Painting, however, didn't seem to have enough to do with winning the war, so she went to work as a weldor with the Carrier Corp. She may be seen in the picture below working at her new job—brazing spacers on the ends of distributing tubes for non-stratifying coils. The non-stratifying coil is used in heating systems to prevent freeze-up and to insure uniform temperature throughout the coil.

NEW LENS SPEEDS ALUMINUM WELDING!

Glare from hydrogen flame and burning flux eliminated... eye strain, fatigue, mistakes reduced... that's the story in a nutshell of the amazing new McDonald BURT-WELD Lens. Only slightly opaque, it enables welders to see their work for the first time, filters out only the blinding glare. Standard size and shape, it fits any goggle taking a 50 mm. round lens.

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Safety FROM HEAD TO FOOT

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SEE BETTER WITH GREATER *Safety*

★ A trial will convince — you get better visibility, greater comfort and safety with this Cesco Helmet.

No. 400 Welders Helmet

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Variable Core construction permits stepless heat changes while welding. Magic Eye-Pilot indicates when machine is on.

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Power cost 50% lower than motor generators. No rotating parts at all, therefore supervision, oiling, replacement of wearing parts eliminated.

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corrected welders if desired.

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available from 150 to 2000 amperes.

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HERCULES ELECTRIC & MFG. CO. INC.

MANUFACTURERS OF THE PRECISION WELDER WITH THE

STREAMLINED ARC

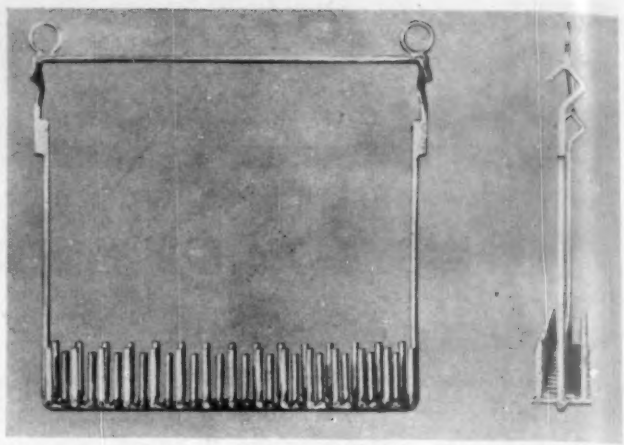
2416 ATLANTIC AVENUE · BROOKLYN, N. Y.

Welding Copper to Steel

By ALFRED A. WALD

COPPER, one of our most critical metals, was held to a minimum in the building of the chromeplating rack pictured herewith. The hooks themselves had to be of pure electrolytic copper as they rest on the work bars in the plating tank and must make perfect contact as the electricity passes through to the work. To conserve copper, however, a framework of mild steel (SAE 1020) was welded to the hooks; this was, in effect, a brazing operation performed with copper electrodes.

The steel pins are fitted within the rack by a heavy machine part. Since the clearance tolerance is practically nil, the pins must be held to close specifications. The use of arc welding, it was found, produced the minimum of distortion.



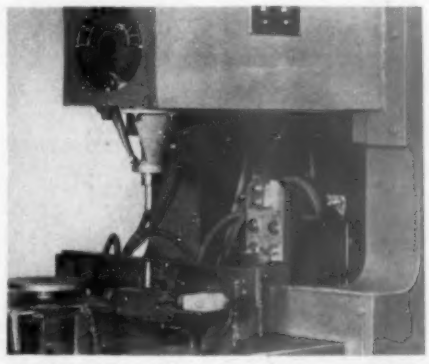
A steel framework was welded to copper hooks in the construction of this rack for chromeplating.

Courtesy, The Hobart Brothers Co.

» «

Riveting with a Welder

EQUIPMENT originally developed for spot welding has been ingeniously converted to the riveting of stamped assemblies by the Progressive Welder Co. The machine used still looks like a spot welder, as may be seen from the accompanying illustration. However, it has been equipped with an indexing table and now rivets the vanes of hydraulic flywheels.



Spot welding machine adapted for hot-upsetting and riveting the vanes of hydraulic flywheels.

The ends of the vanes stick through holes in the faces of assembly rings. When the electrodes are brought down under pressure, the vane ends are heated and hot-upset in order to rivet the parts.

The proper amount of heat for the operation is obtained by a conventional resistance welding timer. A lower current density is employed than would be used for welding.

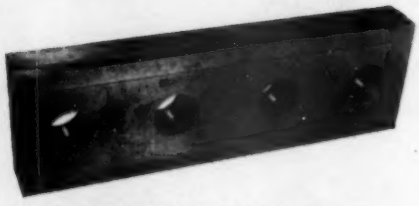
» «

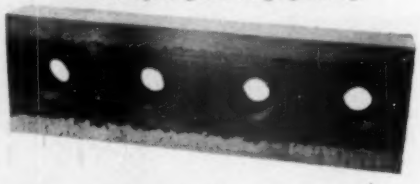
Music and War Work

WELDING to music? Well, maybe that is a bit far fetched; nevertheless, music as a weapon of war production is today being studied seriously by many agencies. A recent issue of *The Victory Fleet*, publication of the U. S. Maritime Commission, laid special emphasis on the use of music in shipyards. "Music is being rediscovered," one article said, "as an accompaniment to work. Sea chanteys and work songs were once an integral part of physical labor."

Still going strong after two weeks

Where Uncoated Blades Quit in Five Days...





HOT SHEAR BLADES, *(above) prior to hard-facing with Coast Metals, and (below) after hard-facing and rough grinding.*

YES,—these hot shear knives have what it takes to shear 6⅛" x 3¾" stainless steel containing 15% manganese. Protected with a Coast Metals Hard-Facing that is particularly resistant to heat and abrasion, they stayed continually on the job for 15 days straight, shearing 1,800 tons every 24 hours. And were still going strong,—when a change in production schedule became necessary. Here uncoated blades lasted only 5 days.

Another mill reports, after coating its knives with Coast Metals alloy, that it is now shearing 69,000 tons of armor plate steel, whereas 13,000 tons formerly had been the limit. In still a third plant, blades faced with Coast Metals are outwearing and outlasting blades faced with other materials 4 to 1. And so it goes!

COAST METALS HARD-FACING is today's answer to making your equipment, both old and new, last longer. Easily welded by the electric arc or gas torch to all ferrous metals.

Write for "Your Equipment's Best Protection Against Wear"

COAST METALS, INC.

Plant and General Offices: Canton, Ohio
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COAST METALS *hard-facing weld rods*

MAKE YOUR EQUIPMENT LAST LONGER

National Emergency Steel Specifications Revised (1943)

CONDITIONS surrounding production of alloy steels have made necessary certain changes in the chemical composition of National Emergency (NE) steels, according to revisions of the American Iron and Steel Institute dated August 15, 1943.

The modifications were made by representatives of the Metallurgical and Conservation Branch of the Steel Division of the War Production Board; the Office of the Chief of Ordnance, Technical Division, U. S. Army; and members of the Iron and Steel Division of the Society of Automotive Engineers, the S.A.E. War Engineering Board and the Technical Committee on Alloy Steel of American Iron and Steel Institute.

Good Quality Scrap

It has been apparent for some time that the National Emergency Steel specifications could be revised in a manner which would permit greater use of nickel and chromium. Since these strategic elements appear in most of the steels used for war materials, steel scrap has been running high in nickel and chromium. This, however, is only one of the factors influencing the change.

The changes were made to permit greater flexibility in the use of scrap, particularly in the handling of turnings and borings; to make possible higher recovery of molybdenum from steel scrap; and to remove objections on the part of steel consumers to the use of steels containing higher than normal quantities of silicon.

Silicon Requirements Reduced

To accomplish these ends the NE 9400 series was modified by reducing the silicon content to 0.20-0.35%, increasing the chromium content to 0.30-0.50%; and increasing the nickel content to 0.30-0.60%. These changes will not materially affect the hardness characteristics of the steel and so should not adversely affect the testing programs now in progress. The chromium content of NE 9262 was revised to read 0.25-0.40%.

NE 8020, NE 8442 and the entire NE 9600 series have been withdrawn. Three new NE steels have been added. They are NE 9261, NE 9425 and NE 9545.

The analyses of the revised alloy steels which will be available are given in Table I.

Table I—NE Steels

CARBON-MANGANESE STEELS

	C	Mn	Si
NE 1330	0.28-0.33	1.60-1.90	0.20-0.35
NE 1335	0.33-0.38	1.60-1.90	0.20-0.35
NE 1340	0.38-0.43	1.60-1.90	0.20-0.35
NE 1345	0.43-0.48	1.60-1.90	0.20-0.35
NE 1350	0.48-0.53	1.60-1.90	0.20-0.35

NICKEL-CHROMIUM-MOLYBDENUM STEELS

	C	Mn	Si	Cr	Ni	Mo
NE 8613	0.12-0.17	0.70-0.90	0.20-0.35	0.40-0.60	0.40-0.70	0.15-0.25
NE 8615	0.13-0.18	0.70-0.90	0.20-0.35	0.40-0.60	0.40-0.70	0.15-0.25
NE 8617	0.15-0.20	0.70-0.90	0.20-0.35	0.40-0.60	0.40-0.70	0.15-0.25
NE 8620	0.18-0.23	0.70-0.90	0.20-0.35	0.40-0.60	0.40-0.70	0.15-0.25
NE 8630	0.28-0.33	0.70-0.90	0.20-0.35	0.40-0.60	0.40-0.70	0.15-0.25
NE 8635	0.33-0.38	0.75-1.00	0.20-0.35	0.40-0.60	0.40-0.70	0.15-0.25
NE 8637	0.35-0.40	0.75-1.00	0.20-0.35	0.40-0.60	0.40-0.70	0.15-0.25
NE 8640	0.38-0.43	0.75-1.00	0.20-0.35	0.40-0.60	0.40-0.70	0.15-0.25
NE 8642	0.40-0.45	0.75-1.00	0.20-0.35	0.40-0.60	0.40-0.70	0.15-0.25
NE 8645	0.43-0.48	0.75-1.00	0.20-0.35	0.40-0.60	0.40-0.70	0.15-0.25
NE 8650	0.48-0.53	0.75-1.00	0.20-0.35	0.40-0.60	0.40-0.70	0.15-0.25
NE 8720	0.18-0.23	0.70-0.90	0.20-0.35	0.40-0.60	0.40-0.70	0.20-0.30

SILICON-MANGANESE AND SILICON-MANGANESE-CHROMIUM STEELS

	C	Mn	Si	Cr
NE 9255	0.50-0.60	0.70-0.95	1.80-2.20	.....
NE 9260	0.55-0.65	0.75-1.00	1.80-2.20	.....
NE 9261	0.55-0.65	0.75-1.00	1.80-2.20	0.10-0.25
NE 9262	0.55-0.65	0.75-1.00	1.80-2.20	0.25-0.40

MANGANESE-NICKEL-CHROMIUM-MOLYBDENUM STEELS

	C	Mn	Si	Cr	Ni	Mo
NE 9415	0.13-0.18	0.80-1.10	0.20-0.35	0.30-0.50	0.30-0.60	0.08-0.15
NE 9420	0.18-0.23	0.80-1.00	0.20-0.35	0.30-0.50	0.30-0.60	0.08-0.15
NE 9422	0.20-0.25	0.80-1.10	0.20-0.35	0.30-0.50	0.30-0.60	0.08-0.15
NE 9425	0.23-0.28	0.80-1.10	0.20-0.35	0.30-0.50	0.30-0.60	0.08-0.15
NE 9430	0.28-0.33	0.90-1.20	0.20-0.35	0.30-0.50	0.30-0.60	0.08-0.15
NE 9435	0.33-0.38	0.90-1.20	0.20-0.35	0.30-0.50	0.30-0.60	0.08-0.15
NE 9437	0.35-0.40	0.90-1.20	0.20-0.35	0.30-0.50	0.30-0.60	0.08-0.15
NE 9440	0.38-0.43	0.90-1.20	0.20-0.35	0.30-0.50	0.30-0.60	0.08-0.15
NE 9442	0.40-0.45	1.00-1.30	0.20-0.35	0.30-0.50	0.30-0.60	0.08-0.15
NE 9445	0.43-0.48	1.00-1.30	0.20-0.35	0.30-0.50	0.30-0.60	0.08-0.15
NE 9450	0.48-0.53	1.20-1.50	0.20-0.35	0.30-0.50	0.30-0.60	0.08-0.15
NE 9537	0.35-0.40	1.20-1.50	0.40-0.60	0.40-0.60	0.40-0.70	0.15-0.25
NE 9540	0.38-0.43	1.20-1.50	0.40-0.60	0.40-0.60	0.40-0.70	0.15-0.25
NE 9545	0.43-0.48	1.20-1.50	0.40-0.60	0.40-0.60	0.40-0.70	0.15-0.25
NE 9545	0.40-0.45	1.20-1.50	0.40-0.60	0.40-0.60	0.40-0.70	0.15-0.25
NE 9550	0.48-0.53	1.20-1.50	0.40-0.60	0.40-0.60	0.40-0.70	0.15-0.25

CARBON-CHROMIUM STEELS

	C	Mn	Si	Cr	Ni	Mo
NE 52100A	0.95-1.10	0.25-0.45	0.20-0.35	1.30-1.60	0.35 max.	0.08 max.
NE 52100B	0.95-1.10	0.25-0.45	0.20-0.35	0.90-1.15	0.35 max.	0.08 max.
NE 52100C	0.95-1.10	0.25-0.45	0.20-0.35	0.40-0.60	0.35 max.	0.08 max.

Make Good Piping Better

with

WELDOLETS · THREDOLETS

3 Types Meet Every Need

WeldOlets for butt welded branch connections.

ThredOlets for screwed branch connections.

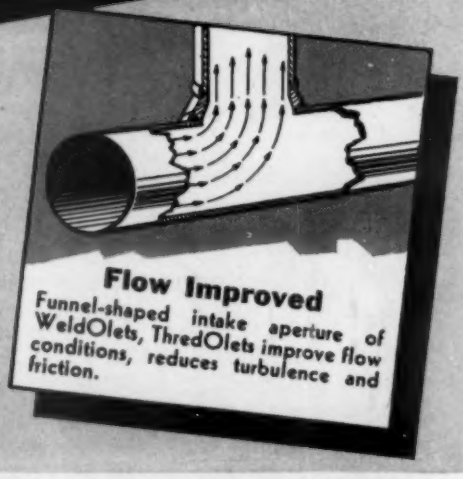
Socket-End WeldOlets for socket-type welded branch connections.

Save Weight

WeldOlets, ThredOlets keep the weight of any piping system to a minimum. Fewer flanged joints mean less possibility of leaks.

Gaskets, Bolts, Nuts

Maintenance eliminated when WeldOlets, ThredOlets are used—no need to change gaskets, tighten nuts and bolts.



Flow Improved

Funnel-shaped intake aperture of WeldOlets, ThredOlets improve flow conditions, reduces turbulence and friction.

Vibration

Due to light weight and improved flow conditions, vibrational stresses are reduced, possibility of leaks eliminated when WeldOlets, ThredOlets are used.

WeldOlets, ThredOlets and Socket-End WeldOlets are suitable for all commonly used pressures and temperatures in every type of piping system. They are installed either before or after erection of the main line—and always with ease and economy. They are equally well adapted to pre-fabricated or "on-the-job" assemblies. Stocked for all standard pipe sizes up to 12" in size-to-size and reducing sizes—and can be supplied on special order for pipe up to 24". Stock fittings are drop forged steel, but to meet special conditions will be supplied in Monel, Everdur, Toncan, Iron, wrought iron, etc.

Bulletin WT31 gives detailed information about all the advantages of WeldOlets, ThredOlets and Socket-End WeldOlets. Write for your copy today.

Forged Fittings Division

BONNEY FORGE & TOOL WORKS, ALLENTOWN, PA.

ARMY NAVY

Star Awarded July 10, 1943

WELDOLETS · THREDOLETS

TRADE MARKS · REG. U.S. PAT. OFF.

Welded Outlets for Every Piping System

Spaghetti Aids Welding

A stick of spaghetti—uncooked but otherwise the same as that you eat with tomato sauce—makes a fine support for a small wire coil which is welded during the assembly of certain electronic tubes.

SPAGHETTI—and that's not bologna—has been put to work to speed the welding of filaments for electronic tubes used for war communications.

The discovery that the popular Italian food could be used to cut by 75% the time formerly required to assemble the tube filaments was made by William A. Hayes, young electronics engineer of the Westinghouse Lamp Division. The spaghetti method is said to produce 50% more filaments and at the same time allow assembly operators to spend part of their time on other production jobs. Because of the important savings in time, man-power and materials, Inventor Hayes has been recommended for a WPB Award of Individual Production Merit.

Temporary Filament Support

The wire filaments for the tubes concerned are coiled in the shape of small springs, ¾ in. long. While being welded, each coil must be held in place by a temporary support of sufficient rigidity to keep an accurate alignment. Formerly, a steel piece about as thick as a seven penny nail was inserted inside the coil for this purpose. The steel had to be split with a saw before insertion and, even so, it was difficult to remove. Hayes was assigned the task of breaking this particular bottleneck.

Like Edison in his experiments to discover a suitable electric lamp filament, Engineer Hayes tried just about everything. Finally, he tried spaghetti. It worked. Not only did the starchy sticks do a satisfactory job of supporting the coil, but there was absolutely no removal problem. Electric current could be passed through the coil after welding, burning up the spaghetti in a flash.

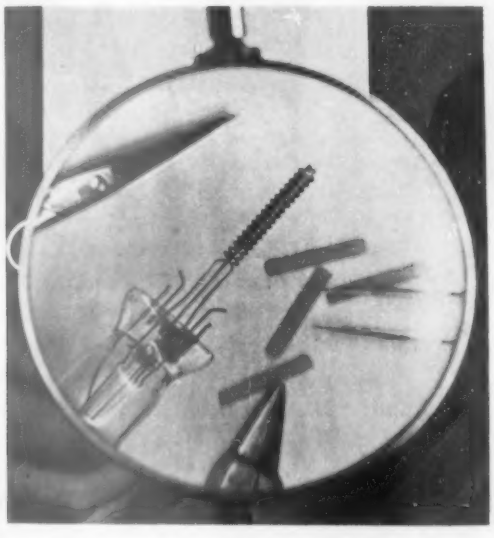
Can Be Machined

In the course of his initial experiments, Hayes made a remarkable discovery: spaghetti can be machined. The first sticks of spaghetti he used were actually machined to the correct diameter on a lathe. That isn't necessary any longer, however, because the spaghetti manufacturer now uses a die which enables him to produce sticks of the proper size.

William Hayes, young electronics engineer at the Westinghouse Lamp Division, examining a short stick of uncooked spaghetti which has been placed inside a wire filament to support it during a welding operation.

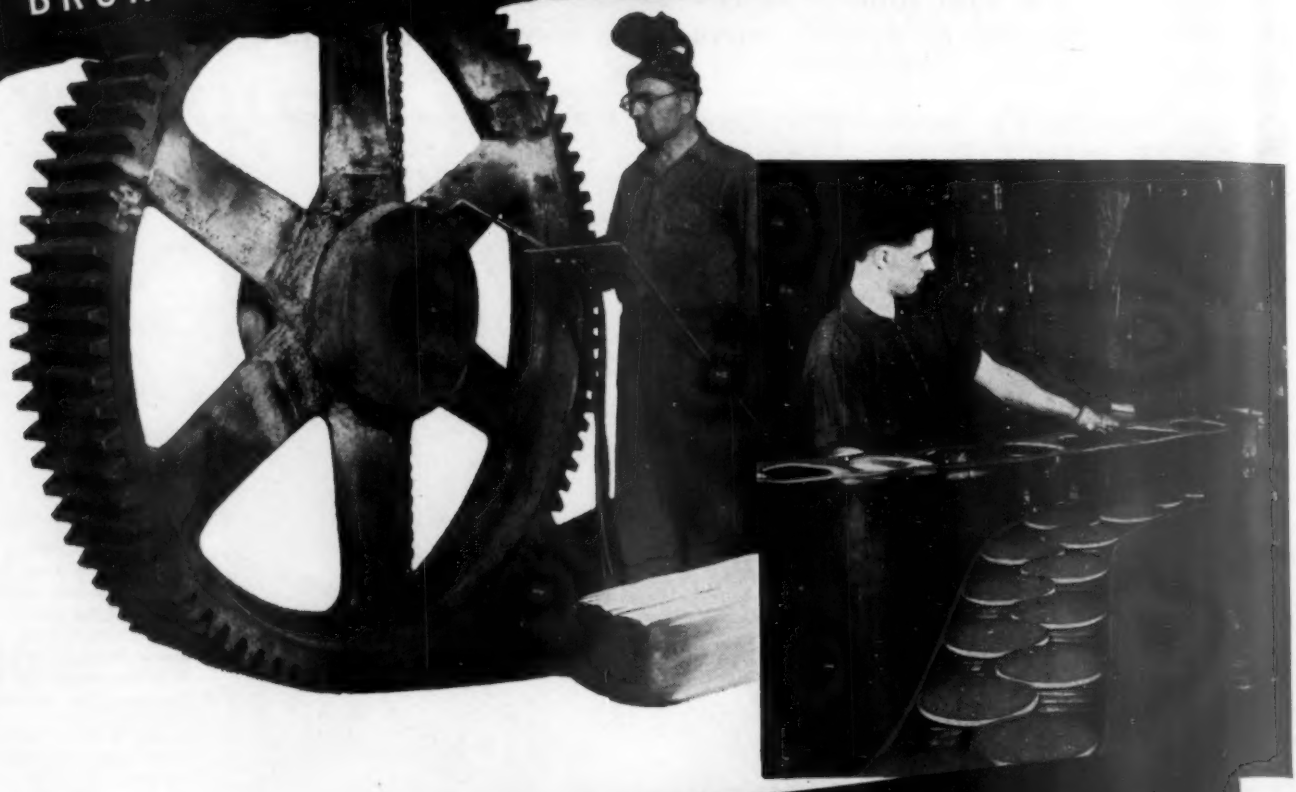
Below: Wire coil and spaghetti under the magnifying glass. After the welding is completed, the spaghetti will be burned away by electric current sent through the coil.

Below: The D'Avella Macaroni Co., Newark, is using a special die to make the spaghetti in the exact OD. After emerging from the die, the strings of war-bound spaghetti are placed on drying racks.



Although spaghetti was first applied to the assembly of filaments for one particular type of tube, Westinghouse officials plan to extend its use to other tubes as soon as possible. From now on, spaghetti is in war production!

BRONZE REPAIR WELDS LIKE THIS: . .



REDUCE *"down time"* ON WAR PRODUCTION

Anaconda 997 Low-Fuming Rod repairs this fractured press gear for punching artillery shell discs . . . saves several months delay for replacement.

When this large gear on a press punching out shell case discs cracked and ground to a stop, it was apparent that a new gear could not be obtained for several months. But production was interrupted for only two weeks—thanks to low-temperature bronze repair welding with Anaconda* 997 Low-Fuming Rod. The Hebeler Welding Company of Buffalo, New York, well-known specialists, did the job using 125 pounds of rod and 900 feet of oxygen and acetylene. Chipping and welding required but 55 manhours.

This is but one of countless instances where Anaconda Welding Rods including Anaconda 997 and Tobin Bronze* have saved valuable production time in war-essential industries. Consider their use before scrapping any important machinery that seems beyond salvage. 4888

*The trade-marks "Anaconda" and "Tobin Bronze" are registered in the U. S. Pat. Off.

THE AMERICAN BRASS COMPANY
General Offices: Waterbury 88, Connecticut
Subsidiary of Anaconda Copper Mining Company
In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

ANACONDA

Anaconda Welding Rods

BACK THE ATTACK WITH AN EXTRA WAR BOND

Flame-Cutting Car Rails

Scrap is badly needed if steel mills are to be kept in production at a rate sufficient to assure the success of our war effort. Luckily, abandoned street railways represent a prolific scrap source.

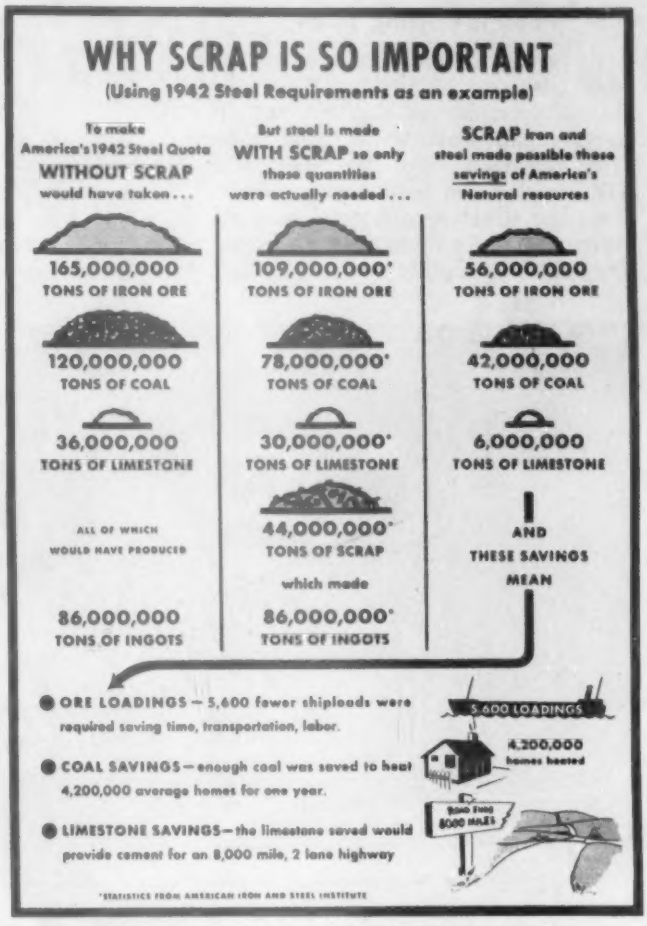

WHY SCRAP IS SO IMPORTANT
(Using 1942 Steel Requirements as an example)
To make America's 1942 Steel Quota WITHOUT SCRAP would have taken...
But steel is made WITH SCRAP so only these quantities were actually needed...
SCRAP iron and steel made possible these savings of America's Natural resources
165,000,000 TONS OF IRON ORE
109,000,000* TONS OF IRON ORE
56,000,000 TONS OF IRON ORE
120,000,000 TONS OF COAL
78,000,000* TONS OF COAL
42,000,000 TONS OF COAL
36,000,000 TONS OF LIMESTONE
30,000,000* TONS OF LIMESTONE
6,000,000 TONS OF LIMESTONE
ALL OF WHICH WOULD HAVE PRODUCED
44,000,000* TONS OF SCRAP
which made
AND THESE SAVINGS MEAN
86,000,000 TONS OF INGOTS
86,000,000* TONS OF INGOTS
ORE LOADINGS — 5,600 fewer shiploads were required saving time, transportation, labor.
5,600 LOADINGS
COAL SAVINGS — enough coal was saved to heat 4,200,000 average homes for one year.
4,200,000 homes heated
LIMESTONE SAVINGS — the limestone saved would provide cement for an 8,000 mile, 2 lane highway
8000 Miles
*STATISTICS FROM AMERICAN IRON AND STEEL INSTITUTE

Fig. 1—We need scrap, and this chart shows why.

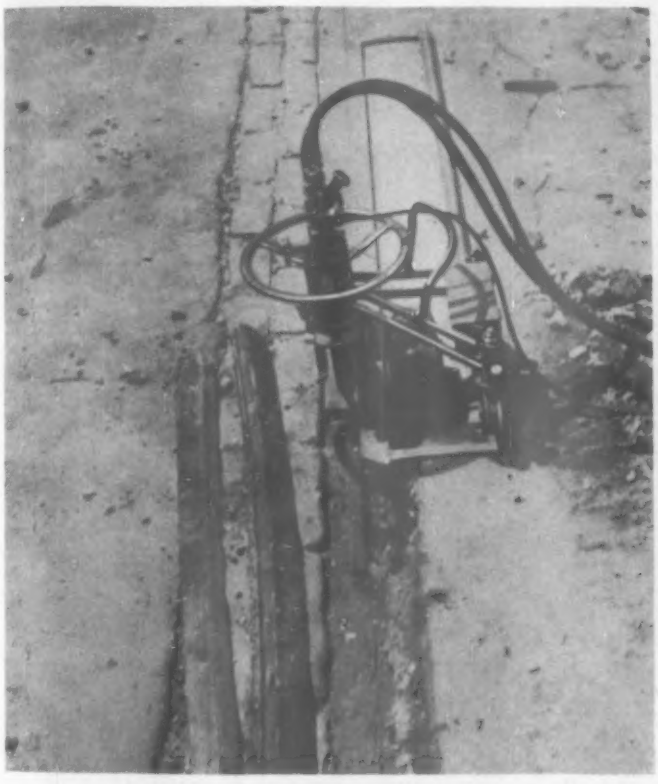


Fig. 2—A portable oxy-acetylene cutting machine operating on a special track can be used to cut abandoned streetcar rails. A section of the cut rail appears in the left foreground.

SCRAP is getting scarce. Last summer the scrap campaign went along fine, for there were years and years of accumulated scrap in vacant lots, behind barns and in other readily accessible places—scrap that was just waiting to be gathered and taken to the blast furnace. Now that easy scrap is gone. Nevertheless, scrap must still be obtained if our war demands are to be met.

Unless the blast furnaces are fed 50,000,000 tons of scrap this year, it will be necessary to mine 56,000,000 additional tons of iron ore, 42,000,000 additional tons of coal and quarry 6,000,000 additional tons of limestone. These huge quantities of materials, needless to say, present a next to impossible task in view of our present manpower shortage. What such quantities involve in readily understood terms is told in Fig. 1. Our coal and iron ore can be put to more productive use than replacing scrap while scrap still remains available.

One of the most fruitful sources of good high grade scrap at present is in those towns and cities which have abandoned street railway systems. Some of these old car tracks were dug up in prewar days and sold to Japan. In many instances, however, they are still lying in the streets just waiting to be removed and sent to the steel mills. The problem of removal is not too great when the rails are exposed; *i. e.*, not covered by black-top.

Fig. 3—This partially cut girder-type rail shows how a single cut severs the top of the rail from the web. Flame-cutting may also be used to cut the rail to shipping size.

Flame-Cutting Rails

Rails may be removed from paved streets by one of two methods—the choice depends on the amount of street repair work to be undertaken after the rails have been removed. The simpler and least costly method from the street repair standpoint involves the use of machine flame-cutting. This method is particularly well adapted for the removal of girder-type rails.

Its operating simplicity and high cutting speed make the machine highly efficient, and there are several economies which can be realized from adopting it. The flame-cutting process permits removal of the rails without breaking the adjacent pavement, even when the asphalt, macadam, stone blocks or bricks have been laid flush with the top of the rail. Hence this method of rail removal should be quite attractive from the standpoints of the municipality and the street car company. Costs are kept at a minimum, and the removal cost is more than covered by the sale of the scrap rails.

In this method, the flame-cutting machine (Fig. 2) is positioned on a short track. Two or more sections of such track can be used so that the cutting operation will be carried on constantly. The cutting torch of the machine is equipped with a bevel-cutting nozzle, and a single cut is made at an angle along the groove of the rail, severing the top of the rail from the web in two long continuous sections. The close-up, Fig. 3, shows how the cut has severed the entire top of the rail from the web. After the rail has been cut in this manner, it can be easily removed with a pinch bar. The disadvantage of the method is that the web and bottom flange—representing an amount of steel approximately equal to that removed—are left in the street.

Uprooting Rails

The second method removes the entire rail but, because of the system employed, creates a more costly repair job, one which often exceeds the scrap value of the rail. In this removal process, the rail is literally torn from the street by a special roller device of all-welded construction, Fig. 4. This roller-type removal device consists essentially of a 6 in. diam steel roller about 30 in. long suspended between a steel yoke made of ¾ by 3 in. bars. The yoke is rigidly braced and welded so as to withstand the severe strains to which it is subjected. A sheave and a cable eye are mounted at the head end of the yoke.

The use of this roller is supplemented by a sheave block and a truck fitted with a winch, Fig. 5. When placed in operation, the winch cable is reeved between the block and work sheave in such a manner as to form a three-part line. This arrangement gives the roller the maximum amount of purchase and greatly increases the effective pulling power of the winch.

For those who have an all-welded rail removal roller of this type, the actual removal of rails from the pavement is simple. The toughest part of the job is the first step, the breaking away of the pavement from the rail at the starting point. If the removal operation is started at any point other than at the end of the rail, it will be necessary either to remove the splice plate or cut through the rail to obtain an end which may be placed on top of the roller. If the starting point is at the end of the rail, the removal is then merely a matter of jacking up the end of the rail sufficiently high to get the roller under it.

The roller should run on 2 or 3 in. by 12 in. planks laid on each side of the rail. The use of planks, set close to the rail, is recommended because they provide a smooth path for the roller and also tend to reduce the seeming desire of the entire street to adhere to the rail and come up with it.

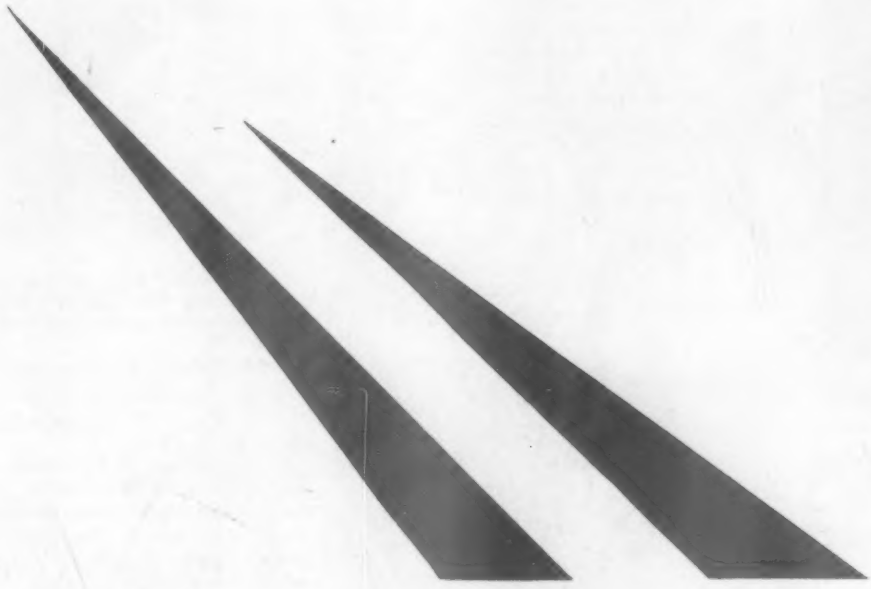
A careful investigation of *all* sources of scrap material is one of the most important steps that can be taken to avert the scrap crisis. Abandoned tracks provide a scrap source which should be given particular consideration in view of these simple methods of rail removal. The full utilization of this old rail should go a long way toward alleviating the present shortage and keeping our steel mills at their full capacity.

Fig. 4—A close-up of an all-welded, roller-type rail remover.

Fig. 5—Aided by a winch truck, the roller-type rail remover of Fig. 4 literally tears the rail from the pavement.

* * *

Figs. 2 and 3 are through the courtesy of the Linde Air Products Co. and Figs. 4 and 5, courtesy Chester L. Wright.



WE of THE WELDING ENGINEER congratulate The Pullman Standard Car Manufacturing Company, one of America's outstanding welding fabricators, and their advertising agency Charles Daniel Frey upon the advertisement reproduced on the opposite page.

This message is not only a specific example of the vision of one pre-eminent welding fabricator, it is an inspiration and a challenge to the entire welding industry.

The readers of THE WELDING ENGINEER—men who are today engaged 100% in war production—gladly accept the responsibility of supervising WELDING THE WORLD OF TOMORROW.

THE WELDING ENGINEER

New Products to Use

A-C Welder

★ A new tool for heavy industry, the **Ampac "400"** A-C welder, has been introduced to supplement the Ampac "200" welder announced a few months ago. The new 400 amp size, it is stated, was chosen as ideal after an extensive investigation of the average industrial welding shop's wartime needs. The "400" uses the same basic electric circuit as the "200" (see page 60, June, 1943, THE WELDING ENGINEER).

Ampac "400." It will handle ¼ in. electrodes on 24-hour-day continuous operation.

The new welder will handle ¼ in. electrodes on the basis of 24-hour-a-day continuous operation while providing capacity for rods up to ⅜ in. when needed. It may be adapted to automatic welding. A range of 50 to 500 amp is provided, with eight turns of the control handle covering the entire range. Other features are said to be low idling loss, high power factor (power factor correction is available if desired) and high efficiency and excellent welding characteristics over the entire range. **Allis-Chalmers Mfg. Co.**, Milwaukee.

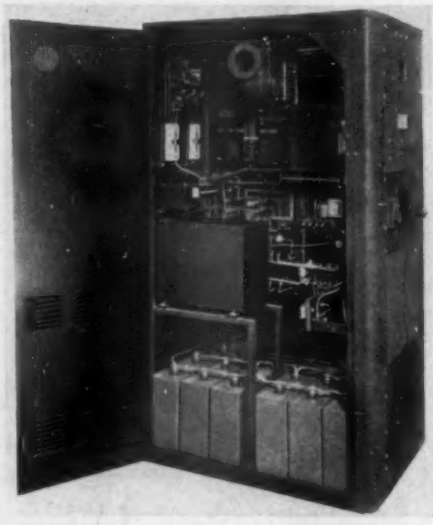
» «

Weld Control Unit

★ The new Model 135 single phase **"Revers-O-Charge"** capacitor weld unit has been designed to fill the need for a smaller welding control incorporating many of the important features hitherto found only in the larger three-phase Weltronic units. The Model 135 uses from one to twelve 120 microfarad condensers, giving a variable capacity of from 120 to 1,440 microfarads. As in the three-phase "Revers-O-Charge," the reversed counter voltage of the discharging welding transformer is used to partially recharge the condenser bank after each weld. In this way, the line surge at the beginning of each charge is considerably diminished.

Both discharge and recharge of the condenser bank are accomplished entirely by electronic means, and without the use of moving parts between the condenser bank and the welding transformer. The charging voltage is electronically maintained to within a plus or minus 2%. Maximum operator safety is insured by a shorting bar, which discharges the condenser bank when (1) the power is shut off, (2) the service doors opened, or (3) when changing the condenser capacity. The unit has a dead front and a swing out sequence panel. A mushroom-headed "start" button prevents accidental operation.

The Model 135 is 6 ft high and occupies a floor space of approximately 2½ by 3 ft. **Weltronic Company**, 20735 Grand River, Detroit 19.



Weltronic Model 135. A single-phase welding control incorporating features hitherto found only in larger three-phase units.

» «

Temperature Control Switch

★ **Model VD-3** temperature control has three switches, which may be: (1) normally closed, opening on a rise of temperature; (2) normally open, closing on a rise of temperature, or (3) single pole, double throw switches. Individual adjusting screws set the temperature at which each switch operates. The main temperature adjustment is outside of the case and covered by a watertight cap so that the differential between the switches is not affected by a change in temperature. The difference between operating temperatures of any two switches may be from 300 to 800 F, and instruments may be furnished for temperatures from —100 F to 1,400 F. **Burling Instrument Co.**, 253 Springfield Ave., Newark, N. J.

Welding Positioners

★ **Harnischfeger Corp.**, Milwaukee 14, is introducing a line of P&H positioners featured by a dual capacity rating for each model. The WP-16 in the 6,000 lb class, for example, handles loads up to 6,000 lb and also has a secondary capacity of 9,000 lb maximum. Standard models in this line are being made in dual capacities up to 24,000 lb.

P&H Model WP-6 welding positioner featuring dual capacity. Models are available in capacities up to 24,000 lb.

Construction is for heavy-duty service, employing all-welded rolled steel throughout with strong box-type mountings. By placing the elevator column farther back, greater clearance is provided for handling larger weldments. Self-locking worm gear and spindle drive on the tilting motion prevent upsets; limit switch and adjustable stop brackets give additional safety when extreme tilting is necessary. Table top is bolted to a bull gear; if desired, the table can be removed to allow special weldments or fixtures to be bolted directly to the bull gear. Individual magnetic push-button stations control the two separate motors for tilting and turning. A roller-equipped yoke with self-locating stops provides a free-running elevation of table for hoisting. Auxiliary equipment available includes self-leveling platform for welding operator, variable speed for table turning, power elevation, etc.

» «

Hydraulic Testing Machine

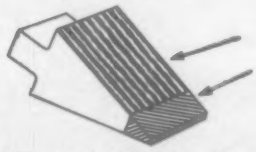
★ **Riehle Model 505** is a universal hydraulic testing machine which can be used for tensile, compression or Brinell hardness tests of welded sections. It has a maximum capacity of 60,000 lb. Features are: a rubber-mounted dial panel with inclination adjustable to suit the height of the operator; two motor drives —one for hydraulic loading and a second for fast vertical adjustment of gripping head and table; spherically suspended gripping head and table; attachment for Brinell hardness testing. **Riehle Testing Machine Div., American Machine and Metals, Inc.**, East Moline, Ill.

HARD-FACING Keeps Excavating and Construction Equipment at Work

Welding shops can provide a valuable service in helping to keep essential equipment at work by means of hard-facing. Wearing parts last from 2 to 15 times longer when they are hard-faced with Haynes Stellite Company's rods, and save time and material ordinarily required for replacements. This work is particularly useful for excavating, and construction equipment parts, such as those described below.

SCARIFIER TEETH

WHEN TO HARD-FACE	Either when new or when worn. The tooth must be sharp and the top side of the point should be cleaned on a buffing or grinding wheel.
WHAT ROD TO USE	Haystellite Tube or Composite rod, 16 on 24, or 24 on 36 mesh, ¼-in. diameter.
HOW TO HARD-FACE	Prop up teeth so the area to be hard-faced will be level, and apply the rod by the oxy-acetylene process. The deposit need extend no more than 2 in. up from the point, and should be from 1/16 in. to ⅛ in. thick.
WHY HARD-FACE?	Hard-faced teeth stay sharp many times longer, and the application can be repeated several times.

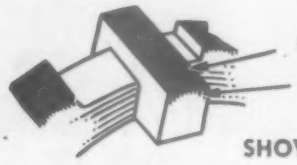


SHOVEL TEETH

WHEN TO HARD-FACE	Greatest economies are effected if hard-faced when new, replacing the deposits before worn entirely away.
WHAT RODS TO USE	Hascrome rod, 3/16-in. diameter; Haystellite Rod, 16 on 24, or 24 on 36 mesh, ¼-in. diameter.
HOW TO HARD-FACE	Hard-face electrically with Hascrome rod on all four sides, so that a ⅛-in. deposit extends 2 in. upward from the point. Then, by oxy-acetylene welding, apply stringer beads of Haystellite rod spaced not over ½ in. apart, running from the digging point up the face to the top of the teeth.
WHY HARD-FACE?	Hard-faced teeth stay sharp, and last from 2 to 5 times longer.

TRACTOR DRIVE SPROCKETS

WHEN TO HARD-FACE	After play develops between sprocket teeth and track pad bushings.
WHAT ROD TO USE	Hascrome 3/16-in. hard-facing rod.
HOW TO HARD-FACE	Block up the tractor so the wheel can be turned. By the electric arc method, fill in worn areas with Hascrome 3/16-in. rod, using templets made from a new sprocket to obtain correct shape. Apply the rod in beads across each tooth and peen the deposit to shape while still hot. Further peening after the deposit has cooled to a black heat will work-harden the surface.
WHY HARD-FACE?	Hard-facing extends sprocket life from 2 to 3 times, and reduces wear on track pad bushings.



SHOVEL DRIVING TUMBLERS

WHEN TO HARD-FACE	Tumblers should first be allowed to wear in use; when they no longer operate efficiently, worn areas should be hard-faced.
WHAT RODS TO USE	Steel rod; Hascrome hard-facing rod, 3/16-in. diameter.
HOW TO HARD-FACE	Leave tumbler assembled, blocking it up so it can be turned. Rebuild electrically, within ⅛ in. of finished size, using steel rod. Finish with a ⅛-in. layer of Hascrome rod applied by arc welding using a templet made from a new tumbler as a guide.
WHY HARD-FACE?	Hard-faced tumblers last at least twice as long as new tumblers.

★ *BUY UNITED STATES WAR BONDS AND STAMPS* ★

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

New York 17, N. Y. UCC Kokomo, Ind.

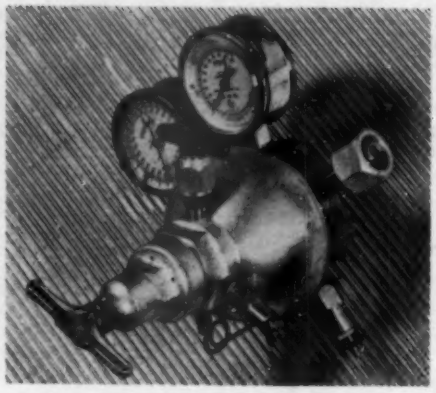
Chicago—Cleveland—Detroit—Houston—Los Angeles—San Francisco—Tulsa

HARD-FACING RODS FOR EVERY PURPOSE

The registered trade-marks "Hascrome" and "Haystellite" distinguish products of Haynes Stellite Company.

Pressure Regulator

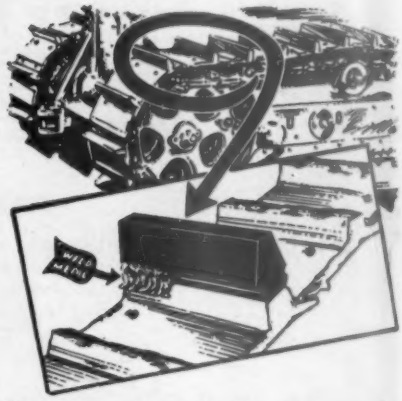
★ Victor **Model No. 4000-1000** pressure reducing regulator is available for inlet pressures up to and exceeding 4,000 psi and for delivery pressures up to and exceeding 1,000 psi. This regulator was designed particularly for the purpose of refilling smaller cylinders to 400 and 800 psi from cylinder manifold systems. Its diaphragm is gas-loaded instead of spring-loaded and is so constructed, it is stated, that damage to or rupture of diaphragm is virtually impossible. This is because the loading pressure of the main regulator is controlled by a built-in pilot regulator which will not permit a diaphragm loading pressure beyond a predetermined maximum.



Victor No. 4000-1000 pilot-type regulator for reducing gas pressures.

Any pressure loss is automatically compensated for by the pilot regulator. Should the loading pressure exceed a desired maximum, an adjustable relief valve will reduce this pressure to normal. The operator can diminish a previously set operating pressure by simply releasing the tension screw of the pilot regulator and exhausting the dome pressure through a "non-leak" release valve. **Victor Equipment Co.**, 844-54 Folsom St., San Francisco.

» «



Worn grousers on tractor-shoes cause tracks to slip and slide. With Bulldog grip-lugs, however, the gripping power of the track may be restored through a simple welding operation.

Tractor Grip-Lug

★ **"Bulldog"** tractor grip-lugs have been introduced by **Allied Steel Products, Inc.**, N.B.C. Building, Cleveland, to facilitate the welded repair of worn grousers on tractor-shoes. The gripping power of the track is restored simply by welding onto the old grouser-shoe a specially designed bar of work-hardening steel (which gets harder and tougher with use). A groove and bevel are provided on the bar to facilitate the deposit of a bead of weld-metal to hold bar and grouser-shoe together. By this method, over 80% of the metal of the old shoe is salvaged and the delay of waiting for the delivery of new shoes is avoided.

» «

Floor Compound

★ **"Absorbo"** is a new oil-and-grease absorbent floor cleaner developed by the **Fidelity Chemical Products Corp.**, 430 Riverside Ave., Newark, N. J. Non-abrasive, odorless, non-poisonous and non-injurious, this product may be readily spread by hand and will absorb up to 45% to 50% of oil or grease by weight, claims manufacturer.

» «

All-Purpose Trailer

★ A new all-purpose industrial trailer, Model N. 610, is announced by the Rose Mfg. Co., Detroit, Mich. Automatic hitch is standard, although the manually operated type may be furnished as optional equipment. Frame is of 3 by 2½ by 5/16 in. T-iron, reinforced by two 2 by 2 by 5/16 in. longitudinal angles. Sale is handled by **H. L. Pitcher Co.**, Strathmoor at Fullerton, Detroit.

SPEEDING SHIPS FOR VICTORY
. . . TO THE OPEN SEAS!

● Plenty of strong welds . . . sure and fast . . . were required on the George M. Cohan, now in the United States Maritime Service. And, that's exactly what shipbuilders got from this portable welding rig . . . and many others like it . . . powered with Pierce-equipped engines!

Pierce Flyball Governors bring to these engines the sensitive, automatic speed regulation required for fast, sure welding. They hold the arc constant, and give split-second recovery of current characteristics . . . within three-tenths of a second after striking the arc! And they are built to give years of trouble-free service.

Now . . . and after the war . . . insist on Pierce Flyball Governors to regulate your welding operations!

THE PIERCE GOVERNOR COMPANY
1607 OHIO AVENUE • ANDERSON, INDIANA

HOW TO MAKE YOUR GOVERNORS LAST!

Like others manufacturing for war needs, Pierce production is for war and essential industry. For this reason new governors can be supplied only on a priority basis. But Pierce calls attention to these easy measures which will make your present Pierce Governors last and give the best service.

- **CLEAN GOVERNORS** once a month with kerosene, gasoline, or prepared cleaner.
- **INSPECT AND CHECK GOVERNORS** each week when in continuous operation.
- **CHECK OIL LEVEL** every day in manually lubricated governors. Use the same grade oil as recommended for the engine.
- **LINE UP** driving pulleys or gears accurately when reassembling governor after cleaning.

Should your governor need repair or reconditioning send it to the factory with the necessary preference rating certificate.

Pierce Governors

USE CHAMPIONS!

Use BLUE DEVIL electrodes in the *vertical* and *overhead* position for sound, clean, highly ductile welds. High deposit efficiency with good penetration, combined with easily removable slag, make BLUE DEVIL electrodes ideal for use on construction of ships, bridges, buildings, pipe lines.

Use BLACK DEVIL electrodes for *downhand* and *horizontal* fillet welds. This electrode produces sound, clean welds free from porosity and with exceptionally high physical characteristics. The BLACK DEVIL is very fast and tests show a high over all deposit efficiency.

Use GRAY DEVIL electrodes with *straight polarity*. They are particularly well adapted for applications where poor fit up exists and produce highly satisfactory fillet welds with easy slag removal. High speed and smooth beads are assured with the GRAY DEVIL electrode.

THE CHAMPION RIVET COMPANY

11500 HARVARD AVENUE, CLEVELAND, OHIO

EAST CHICAGO, INDIANA

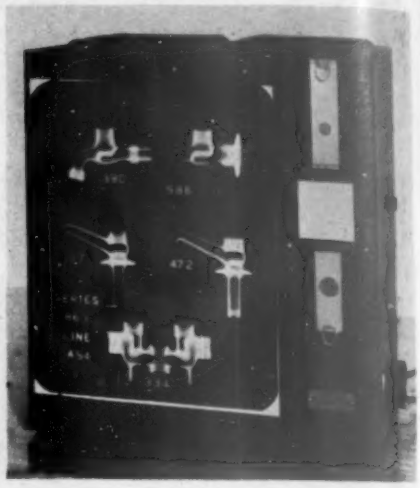
Protective Headgear

★ **"Hedgard"** is a new hard hat built to give three-way protection to its wearer. The top of the crown is reinforced for direct blows, the side of the crown is built to stand glancing blows, and the brim is made sufficiently strong so that it will not crack when dropped. The "Hedgard," it is stated, will withstand an impact greater than eight lb dropped for a distance of ten feet. The blow is first absorbed on the crown, which has a "give and deflect action," and is further absorbed in the cradle-and-sweatband construction, which acts as a shock absorber. The hat weighs slightly more than 13 oz, depending upon the type of sweatband used. **Davis Emergency Equipment Co.**, Halleck St., Newark 4, N. J.

Davis "Hedgard." A shatterproof hard hat designed to protect its wearer against either direct or glancing blows.

Radiograph View Box

★ Exographs of welds may now be inspected under ideal illumination conditions in the new **"Keleket"** high intensity X-ray illuminator. This "view box" is said to provide four times more illumination than heretofore available and to permit observation of film detail formerly missed with weaker light sources. Another advantage is an increase in the usable density of X-ray films (from 1.5 to more than 4.0), with resultant improvement in radiographic contrast.



View box for radiographs. It permits observation of film details which would be missed with weaker light sources.

The box is equipped with a "Variac" control, which affords a stepless increase in light intensity by varying the voltage from 0 to 110 v. Thus the exact amount of light necessary to observe details at various film densities can be obtained.

The illuminator measures a full 14 by 17 in., permitting even the largest film to be viewed entire. Masks are used to reduce the illuminated surface when films smaller than 14 by 17 in. are examined. Films are protected from the heat of the photoflood lamps by a heat-absorbing glass baffle and cooling fans which circulate 900 cfm of air. **The Kelley-Koett Mfg. Co.**, 212 W. 4th St., Covington, Ky.

» «

Drum Plug Wrench

★ A special wrench for removing and tightening plugs or bungs in steel drums is announced by **Industrial Products Co.**, 2820 N. Fourth St., Philadelphia. Fitting all sizes of plugs, it is manufactured in alloy steel with a long iron pipe handle. Another model is available in "S Monel" metal, which has low sparking qualities.

Ipco wrench for tightening plugs or bungs in steel drums.

FOR SMOOTHER WELD GRINDING —3 to 6 TIMES FASTER!

JONES Abrasive Belt SWING GRINDER

You get high-speed weld grinding and smooth, even surfaces with the easy-to-use Jones Abrasive Belt Swing Grinder. This portable unit combines the controlled stock removal feature of a snagging wheel with the smooth surface grinding features of disc grinders.

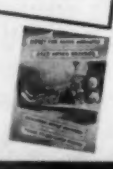
Speed up your tank grinding 3 to 6 times with the easily portable Jones Swing Grinder, using quick-change, fast-cutting abrasive belts. Readily mounted for covering large areas—simple controls handy to operator—uninterrupted high-speed grinding.

The Ideal Unit for Automatic Weld Grinding—Automatic welding is 2 to 3 times faster than manual operation—why not step up your production line another 2 to 3 times using the Jones Swing Grinder to remove that surplus weld!

CHECK THESE JONES FEATURES

- High Speed Cutting
- Smooth, Even Surface
- Uninterrupted Grinding
- Easy to Install and Operate
- Quick Abrasive Belt Change
- Perfect Balance at Any Angle
- Reduces Time and Cost

WRITE TODAY—
A four-page bulletin "The Jones Abrasive Belt Swing Grinder" gives full details on this time saving, cost-cutting unit. Write for your copy today.



JONES ENGINEERING COMPANY
DEPT. C-1 · ELLWOOD CITY, PA.
Manufacturers of Abrasive Belt Grinding Equipment

MORE MAN HOURS THROUGH *Extra* Safety

☆ ***All Meco Safe-T-Chek Regulators*** are equipped with the special patented Safe-T-Chek bleeder valve.

This valve, located in the high-pressure inlet, holds back the flow of oxygen until both seat and diaphragm can come into operating positions *and* controls the flow of oxygen in case of emergency—worn, or burning-out seats—or diaphragm failure.

This extra safety factor, found only in Meco Safe-T-Chek Regulators, thus protects against production delay—protects against regulator failure—and protects against the factors of human accident when regulators cease to function properly.

Enjoy all these Extra safety factors by specifying Meco Safe-T-Chek Regulators.

Meco

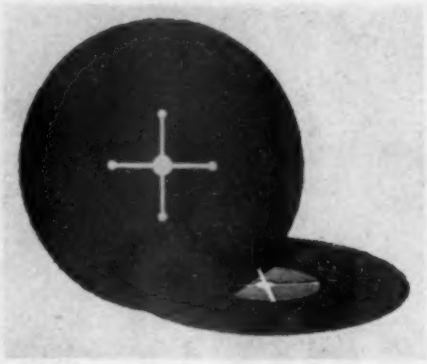
WELDING AND CUTTING EQUIPMENT

MODERN ENGINEERING CO.

3413 PINE BOULEVARD ST. LOUIS, MISSOURI

Sanding Discs

★ **Marvel** abrasive sanding discs, for weld cleaning and similar tasks, are made of sharp-cutting aluminum oxide grit and designed for high-speed, continuous work. The grit is bonded with a heat-resisting resin to a chemically treated, pliable fibre back. The resin bond, states manufacturer, will not soften under high-speed frictional heat. Discs are available in diameters ranging from 6 to 30 in. and in all grit numbers. A sample disc for testing purposes may be obtained by writing to the manufacturer, specifying diameters of disc and arbor hole and number of grit desired, **Fibre Abrasive Corp.**, 1129 East 74th St., Chicago.



Designed for high-speed operation, Marvel sanding discs are bonded with heat-resistant resin to pliable fibre backs.

TYPE CB TRIPLE-DUTY HAMMER

CMD

WELDERS' CHIPPING HAMMERS

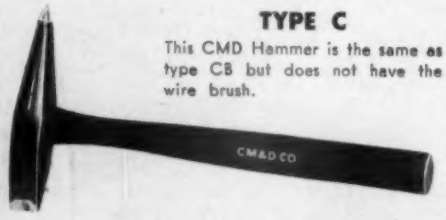
Stay Sharp Longer

Type CB has a convenient wire brush which can be easily replaced when worn. The head combines chisel and drift. Like all CMD Hammers, it is well balanced for easy use from any position—especially important for cleaning overhead welds. Weight, 16 oz.

The heads of CMD Welders' Chipping Hammers are made of exceptionally hard, specially tempered steel. Their cutting edges stay sharp longer and can take more regrindings when sharpening becomes necessary. CMD Hammers are also light, well balanced and easy to use.

TYPE C

This CMD Hammer is the same as type CB but does not have the wire brush.



Order from your Welding Supply House!

If they cannot supply you, order direct! Descriptive circular sent free upon request.

CHICAGO MANUFACTURING AND DISTRIBUTING COMPANY

Dept. W., 1928 West 46th St., Chicago, Illinois

Protective Coating

★ **"Insl-X"** temporary protective coating is said to have withstood 100-hr salt spray tests (3% solution) on steel, copper, brass and aluminum. The coating is applied by brush (or by dip) in a thin film, which air-dries in a maximum of 15 minutes. It is easily stripped off by hand (without the use of solvents) when it is desired to have the metal restored to its original condition. Two types of coating are offered: 002 for short-term protection and 003 for long periods of storage. Its use, states manufacturer, will eliminate the need for greasing and other complicated protective methods such as packing in pliofilm bags. **Insl-X Co.**, 857 Meeker Ave., Brooklyn, N. Y.

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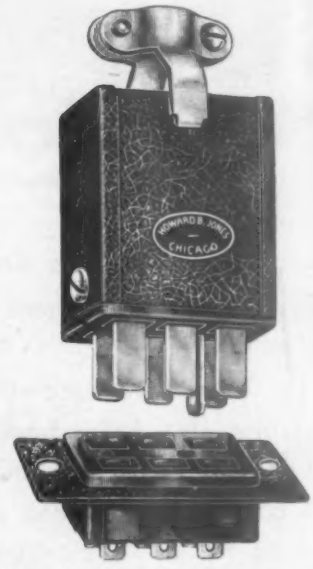


Multicontact plug and socket bodies. Plugs with two up to twelve prongs are available.

Plugs and Sockets

★ A new type of multiple-contact plug and socket has been developed by **Howard B. Jones**, 2460 W. George St., Chicago 18. The line, known as the **No. 2400 Series**, comprises plug and socket bodies with two, four, six, eight, ten and twelve contacts. Four individual flexing surfaces in the socket make contact with each plug prong. Projections on all four sides of the socket lock the prong into position and will prevent any up-and-down movement, manufacturer asserts. Each socket segment is designed to make positive contact over practically its entire surface, providing increased contact area and smoother action.

» «

Metal Marking Machine

★ Either continuous automatic marking of metal strip or roll marking of flat parts may be accomplished with the **"Acromark" No. 52** power marking machine. The flat parts are fed into the machine as in a punch press; the marking roll rolls in the mark; then an automatic ejector thrusts the piece back into the operator's hands. **The Acromark Co.**, 5-7 Morrell St., Elizabeth, N. J.

Wanted: More Crystal-Gazers

In the thirteenth verse of the twenty-eighth chapter of the Book of Ezekiel, mention is made of diamond, beryl, onyx, emerald, sapphire, topaz and other precious stones. That was 688 B. C. For many years before and many years afterward, the world's crystals and ores and minerals were prized only for their rarity or beauty.

In fact, as mineralogists measure time, it was scarcely yesterday that ores and minerals were discovered to be of real use. Until a very few years ago, for example—well within your memory—abundant strontium was little more than a red glow reserved for Fourth of July fireworks, lithium an obscure name in chemistry books.

Today, there are discoveries which open greater and wider horizons for the use of ores and minerals; discoveries which affect your industry as well as scores of others. Foote, by reason of long experience and extensive research into ores and minerals and chemicals, is in the forefront of these developments.

You who in your industry are the "crystal-gazers" of the most practical kind, you whose job it is to know what new thing can be used advantageously in your products, are invited to write us. There is good likelihood that Foote products, processes or research can benefit you.

MOLEHILLS AND MOUNTAINS

The particle size of Rutile is of molehill proportions, but it could make a mountain of trouble. A wild arc could waste a heap of essential metal and valuable production time. It could delay delivery on tanks and ships and guns. But it won't get the chance. For Foote knows, as you do, that particle size influences the efficiency of Rutile as an arc stabilizer. Foote Standard Rutile has, in fact, reached its position of acceptance because of careful grinding and grading, and vigilant laboratory control exercised over variations in the product. Now, with the opening of the Mediterranean and the easing of the shipping situation to South America, Foote has two dependable sources of high grade ore—India and Brazil—and a continuous supply is assured. Foote Standard Rutile is another name for minimum spatter loss, maximum arc stability and smooth operation.

Foote
MINERAL COMPANY

A Step Ahead in Industrial Ores and Chemicals

PHILADELPHIA • ASBESTOS • EXTON, PENNSYLVANIA
Home Office: 1612 SUMMER STREET, PHILADELPHIA, PA.
West Coast Representative: GRIFFIN CHEMICAL CO., San Francisco, California
English Representative: ERNEST B. WESTMAN, LTD., London, England

Heat Regulator

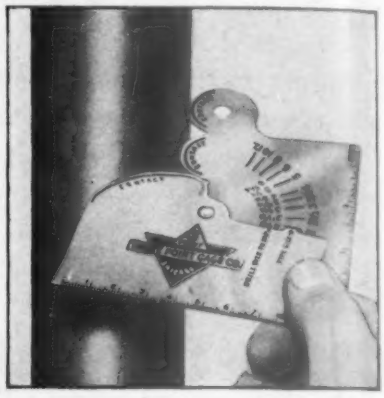
★ An improved type of heat regulator or tap changing switch has now been made standard equipment on all new Thomson resistance welders to provide the various values of welding current needed for different jobs. This regulator was designed to make a firm contact with each of the various tap points while obviating the difficulty of moving the arm from position to position. The designer slid between the horns of this well-known dilemma by providing a clamping knob which is screwed down after each setting to create high contact pressure. When the knob is unclamped, there is no contact pressure and hence no resistance to the movement of the regulator to another position. Indexing positions help to bring the moving contact squarely and completely into each tap position as the clamping knob is tightened. **Thomson-Gibb Electric Welding Co.**, Lynn, Mass.

Thomson improved tap changing switch for regulating resistance welder current. The center knob is tightened to provide a high contact pressure at each station.

» «

Pipe Gauge

★ A new pocket-size **"Three-Point"** pipe gauge is being introduced for instantaneous measurement of all sizes of pipe from ⅛ to 12 in. This gauge consists of two pivoted steel plates with edges curved at three points for contact with the pipe to be measured. The two fixed contact points of the gauge are first placed against the outer contour of the pipe, and the movable part of the gauge is then slid until it makes the third contact, when the marker is read. In addition to showing the pipe size (in terms of ID), the gauge will also give the correct drill size for tapping.



"Three-Point" gauge. It measures pipe sizes from ⅛ to 12 in. and gives drill sizes for tapping.

An additional advantage claimed for this gauge is that it will measure pipe in any position, even against the wall or in a corner, and will measure a covered pipe if there is a small opening near a union or other fitting where the gauge may be slipped in. When closed, the gauge measures 2½ by 4¼ in. **Three-Point Gauge Co.**, 3821 Broadway, Chicago.

» «

Radiant Heater

★ Designed for use in annealing ovens, electric furnaces or wherever high-temperature radiant heat is required, the new **Regan** radiant heater is also able to serve as a resistor. The element consists of coil of nickel-chromium wire wound spirally around a refractory core stated not to deteriorate at temperatures up to 1,700 F. Binding posts and straps may be either Monel metal or nickel-chrome. Heater is obtainable in a range from 32 to 220 volts. **Techtmann Industries**, Inc., 828 North Broadway, Milwaukee.

Castolin Eutectic

EUTECTIC

(Means Lowest Binding Alloy)

LOW TEMPERATURE WELDING

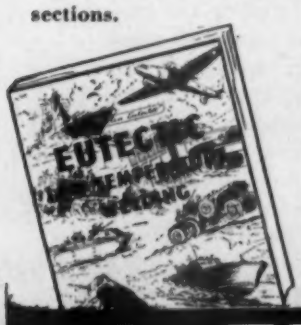
SALVAGING DEFECTIVE ALREADY-MACHINED CASTINGS WITH MACHINABLE EUTECTIC "COLDARC" ALLOY NO. 24

PROBLEM

Salvaging already-machined cast-iron, malleable iron or chrome-nickel alloy steel castings having porous spots or machining errors. . . . When ordinary electrodes were used a hardened fusion line generally resulted. Naturally, this caused great difficulty and time-waste in machining the welded sections.

SOLUTION

Eutectic "Coldarc" Alloy No. 24 (AC-DC). This new kind of electrode can be applied at low heat—without preheating—without deep fusion of the parent metal. Eutectic "Coldarc" Alloy No. 24 gives perfectly *color matching, easily machinable* welds on all ferrous metals. It has been saving hundreds of thousands of dollars in foundries, tool shops, ordnance plants, etc.



Only "Eutectic* Alloys" are the true Low Temperature Welding Alloys that are revolutionizing production welding, maintenance welding and salvaging in war plants throughout the nation. There are 42 specialized rods for every metal and every welding job. Developed and manufactured only by Eutectic Welding Alloys Company.

* Reg. U. S. Pat. Off.

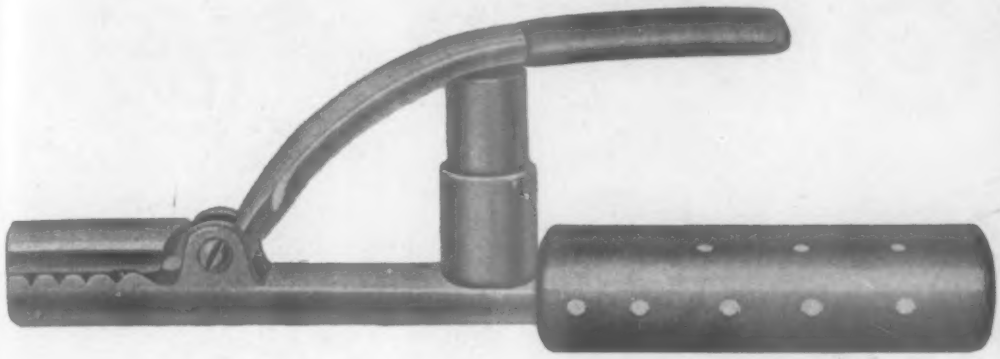
See Demonstration
National Metal Congress
Booth 711 — Chicago — Oct. 18-22

FREE LATEST 36 PAGE WELDING DATA BOOK K

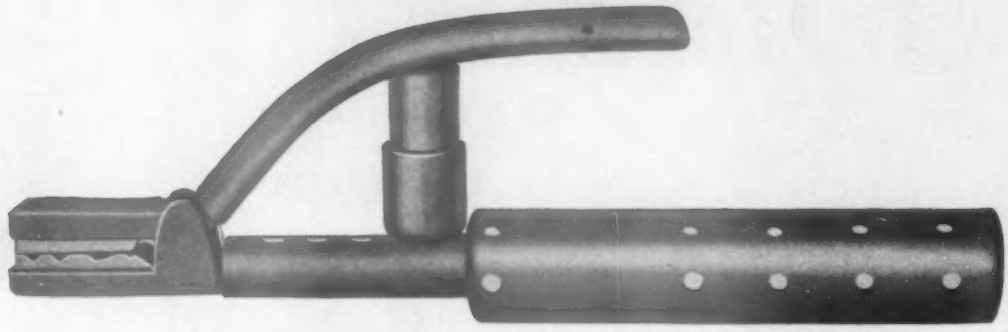
EUTECTIC
WELDING ALLOYS COMPANY
SOLE MANUFACTURER - CASTOLIN EUTECTIC WELDING ALLOYS
40 WORTH STREET, NEW YORK, 13, N.Y.

THERM-ARC ELECTRODE HOLDERS

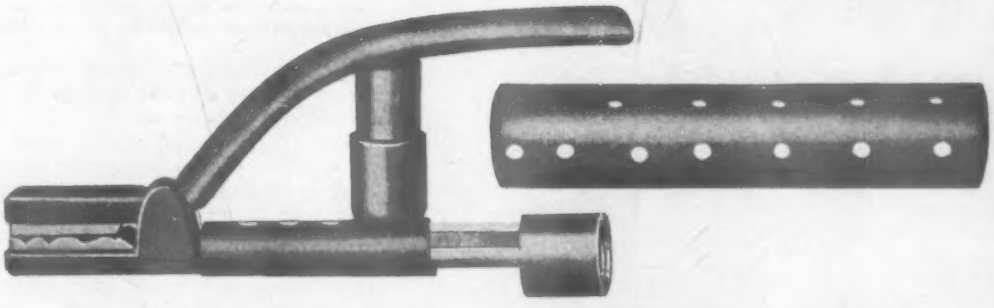
A Type of Holder that has Proven Itself
The only fully-insulated coil spring holder



TYPE N
Partially Insulated



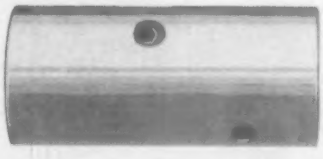
TYPE K
Completely Insulated

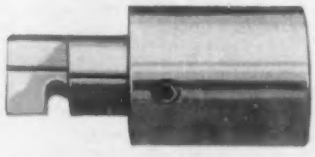


TYPE M
Detachable Completely Insulated With Removable Front

THERM-ARC CABLE CONNECTOR

This unit can be connected or disconnected quickly by a very short turn. The action is instantaneous and a tight, contacting connection is assured throughout entire circumference of male plug; no possibility of loosening while in use.





Write for our attractive, illustrated, descriptive booklet of THERMEX Holders and Cable Connectors.

THERMEX EQUIPMENT COMPANY

2045 Celia St. **Tel. TYler 7-1337**

DETROIT 8, MICH.

Fire Shield

★ The new **"Foamite Fire Shield"** is offered to protect fire-fighters from the effects of the flames they are endeavoring to quench. It may be used for fires out in the open, in oil refineries and, particularly, on airplane landing fields. The shield is said to be of especial value in the close-up fire fighting required when carbon dioxide is used as the extinguisher.

The shield is ruggedly built of sheet steel, reinforced with strong angle irons. An insulating mineral wool blanket 1 in. thick is placed between the front and back plates; this is stated to be capable of withstanding a temperature of 1,200 F.

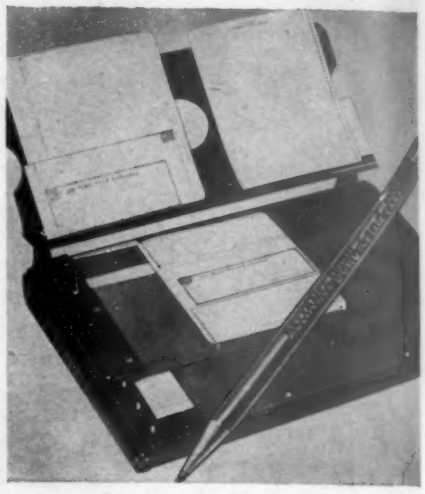
Foamite shield. It protects fire-fighters.

The wheel carriage is bolted to the shield body and provides for ready transportation to the scene of the fire. The rear supports are hinged to fold against the shield body for shipment and when being wheeled into action. Three observation ports and four nozzle ports are provided, each equipped with pivoted cover doors. The shield measures 79½ in. high by 75¾ in. wide. **American—LaFrance—Foamite Corp.**, Elmira, N. Y.

» «

Aids to Payroll Problems

★ Two companies have coöperated to ease the grave burden of payroll work brought about by war tax regulations. **The Todd Co., Inc.**, Rochester, N. Y., manufactures the "Form-Master" form-



New devices to ease the burden of payroll work—the "Form-Master" form-holding device and the Reliance multiple carbon copy pencil.

holding device with which employees' checks or cash payroll statements, payroll summary sheets and individual earnings records can be posted simultaneously, thus eliminating much copying work—and copying errors. With carbon copy work, however, it has hitherto been impossible to find a pencil hard enough to make an impression through five or six carbons which would not cut through the top copy and would make a legible original. To overcome this difficulty, the new "No. 700" multiple carbon copy pencil is being offered by the **Reliance Pencil Corp.**, Mt. Vernon, N. Y. This pencil was specifically created to make both a clear, black original and clean, legible carbon copies. It can be used for all types of form work: orders, requisitions, memos, inter-office communications, etc.

» «

Laboratory Furnaces

★ A complete new line of laboratory furnaces has been developed by the **Lindberg Engineering Co.**, 2444 West Hubbard St., Chicago 12. The line includes a box furnace, a combustion tube, a crucible furnace (for melting base metals, molten salts baths, etc.) and hot plates for heating, distilling, boiling, evaporating.

Give 'em BOTH BARRELS

WITH MARQUETTE
REGISTERED U.S. PAT. OFFICE
A.C. ARC WELDERS

— LOWER COSTS —
- FASTER PRODUCTION -

War production is a double barreled proposition. It takes "hard hitting" with "heavy loads" to keep production lines clicking and up to schedule . . . and that's the kind of performance you get from MARQUETTE Welders.

Years of aggressive leadership in the A.C. field has given these versatile machines the smooth, low cost performance that makes "duck soup" of the toughest welding problems.

In war plants from coast to coast their fast, flawless welding is speeding production and cutting costs making them truly "double barreled" Welders.

BUY THE BEST . . . BUY MARQUETTE
LOW INITIAL COST . . . NEGLIGIBLE UPKEEP
FAST—SIMPLE—LOW COST OPERATION
SUPERB WELDING PERFORMANCE
COMPLETE EQUIPMENT
10 Outstanding Models. 125 to 400 amps. for light work to heavy industrial production.

PROMPT DELIVERY
Send for free, 24 page, illustrated booklet.
MARQUETTE MFG. CO., INC.
MINNEAPOLIS, MINN.

MARQUETTE
a.c. arc welders

A cemented carbide for hard-surfacing steel. A quick economical method of restoring surfaces subject to severe abrasion.

The productive life of tools and other steel parts can be prolonged three to fifteen times by hard-facing with C-T No-Wear Metal, applied quickly and inexpensively by the oxy-acetylene torch. It has a multitude of uses such as hard-facing die blocks for the cold finish drawing of long rectangular steel bars, or on small cast pieces.

No-Wear permits the use of various types of inexpensive base metals for parts operating under highly abrasive conditions.

No-Wear does not oxidize nor is it readily affected by mild acids and other chemicals. For information on the application of No-Wear for your hard-facing applications, send for Bulletin No. 153, or write Callite Tungsten Corporation, 549 Thirty-ninth St., Union City, New Jersey.

Branches: Chicago, Cleveland

No-Wear Metal consists of microscopically controlled particles of pure tungsten carbide in combination with chromium, cobalt and iron.
Available in rods 14" in length, ¼" and 5/16" in diameter.
1 lb. covers approximately 90 sq. in., 1/32" thick.
Hardness: (Rockwell Scale) 63-67 cast; 62-67 gas welded.

CALLITE TUNGSTEN CORPORATION

PIONEERS IN TUNGSTEN METALLURGY OVER 25 YEARS

Do You Agree?

High Carbon Steel Welding

Q—Why is the welding of high carbon steel not recommended in most cases?—*E.M.M.*

A—The welding of high carbon steel is usually avoided because of the defects which result. When steel with a high carbon content is melted, it tends to cool rapidly and thus form a hard, brittle zone of metal at the fusion line. This brittle area is quite weak and may fail when the material is subjected to shock. The higher the carbon content of a steel, the more pronounced is the brittle condition of the weld-zone.

» «

Hardening Crane Rails

Q—Is flame-hardening recommended for crane rails? In our plant, we use 180 lb rails with a 4 in. wide ball. They are 28 ft long.—*D.B.B.*

A—Flame-hardening has been applied quite successfully as a means of hardening crane rails. The only precaution that is necessary in this application is to prevent distortion. This may be done by having an additional spray or quench water play on the rails directly behind the flame in order to obtain a more rapid quench. It is also advisable to play a stream of water on the rail a short distance ahead of the flame to prevent too much heating of the rail. If the rail absorbs too much heat, its hardness will be somewhat reduced and less uniform.

Distortion in a flame-hardening application of this sort presents little difficulty since the rails are usually bolted to a heavy I-beam. According to authorities, the speed of flame-hardening such a rail should be about 4 ipm. It is estimated that about 360 cu ft of oxygen and acetylene will be required per rail.

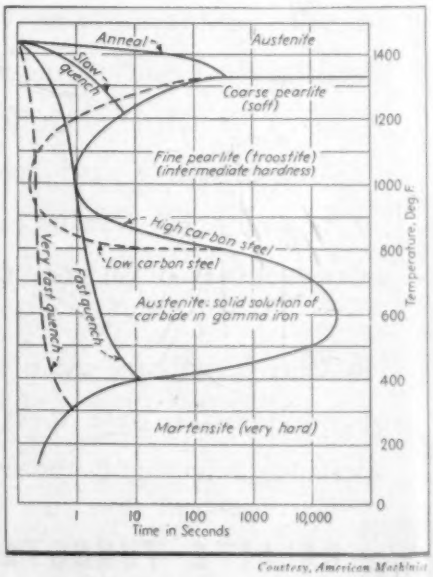
» «

S-Curves

Q—What is an S-curve?—*J.P.*

A—S-curves are curves showing the relationship between time of decomposition of austenite and the critical temperature at which decompositions are allowed to take place. Such a curve is obtained by quenching steel from above its critical temperature to temperatures below the normal transformation temperature. The transformation to pearlite, troostite and martensite is then allowed to proceed isothermally, the extent of the change in a given time being estimated either by following the volume changes with a dilatometer or by quenching in cold water. The latter action retains as martensite any of the austenite which had not changed at the time of the final quench.

The relative areas of martensite and troostite in the quenched specimen afford a good idea of the extent of decomposition. S-curves are valuable in that they have thrown much light on the changes that take place in steel during quenching. An S-curve of a material that is to be flame-hardened will immediately show whether such an application is practical.



Courtesy, American Machinist

A typical S-curve. These curves show the effect of various rates of quenching upon the hardness of low and high carbon steels.

MANGANAL

(Reg. U. S. Pat. Office. U. S. Patents 1,876,738—1,947,167—2,021,945)

11 to 13½% Manganese Nickel Steel

SPECIAL Tite - Kote Welding Electrodes

For Repairing 11 to 14% Manganese Steel with A. C. or D. C. Welders

A light flux coated Welding Electrode that has many advantages.

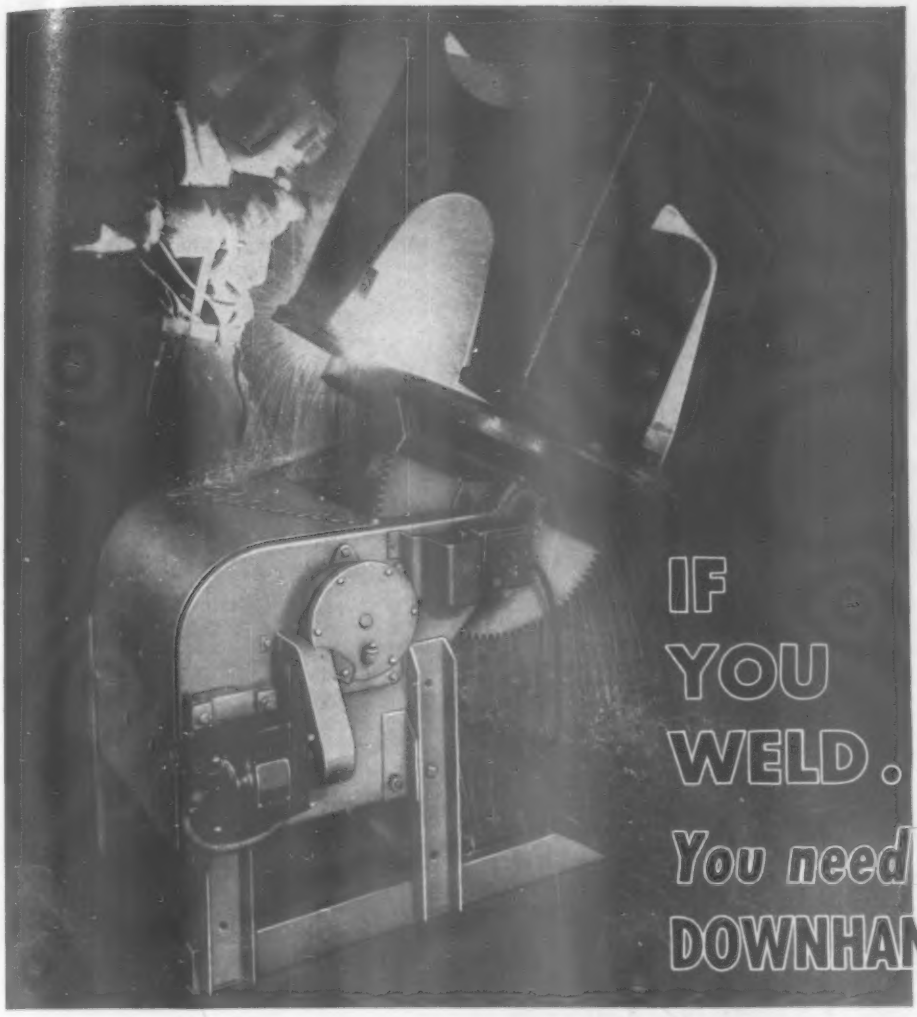
Pump Shell Impellor. Rebuilt with Manganal Welding. Surfaced with Seaco Hard Facing.

- The special self-peeling flux coating that in no way retards the quick cooling of the weld deposit.
- Weld deposits can be peened while hot without the danger of pounding slag into the weld metal.
- Insures the same ductility and toughness found in weld deposits made with MANGANAL BARE WELDING ELECTRODES.
- Better arc manipulation permits spreading of weld deposits. Less spatter loss.
- Supplied in sizes 5/16", 1/4", 3/16", 5/32" and 1/8" by 18" lengths. Packed in 50 pound moisture proof packages.

Sole Producers

STULZ-SICKLES COMPANY

134-142 Lafayette St., Newark, N. J.



Low-cost 500-lb. capacity unit, available either hand-operated or motor-operated

IF YOU WELD . . .

You need the DOWNHAND POSITION

Here's why you need it . . .

Most important, it will greatly increase your welding production. In many cases, it means that you can do a job in one pass that would require two, three or more passes when the weldment cannot be placed in the ideal downhand position.

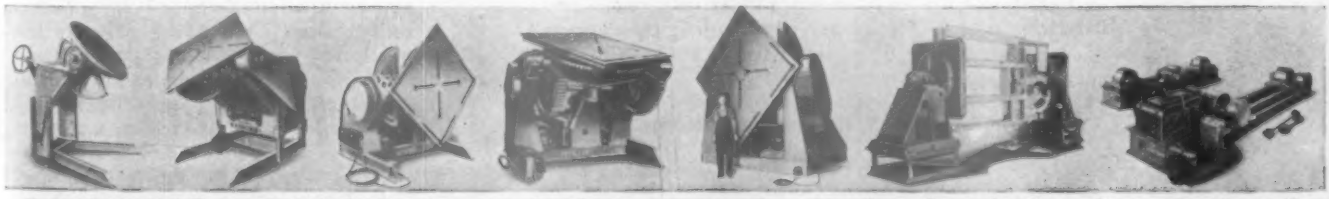
It means smoother, stronger, welds . . . time saved in both handling and welding . . . rod savings . . . and the good will of your welders.

Here's how you can get it . . .

Install Ransome Welding Positioners. With this equipment, your welders can shift their work at will, without crane service, without loss of time, without wasting precious physical energy. Every seam is just where it should be . . . in position for downhand welding.

There's a unit to fit every welding job. ***Write for full information.***

Units on display at National Wartime Metal Congress . . . October 18 to 22 . . .
Room 876, Palmer House, Chicago



Capacities 500-lb. to 40,000-lb., hand-operated and motor-operated . . . Head-stocks and Tail-stocks . . . Turning Rolls

Industrial Division · RANSOME MACHINERY COMPANY · Dunellen, New Jersey
Subsidiary of WORTHINGTON PUMP AND MACHINERY CORPORATION

Ransome WELDING POSITIONERS

Vapor Flux

Q—What is meant by vapor flux? How is it used and why?—*I.P.M.*

A—Vapor flux is a flux that is obtained by bubbling acetylene gas through a liquid flux held in a special dispenser. The flux (in a vapor form) is picked up by the acetylene and carried through the hose and welding torch to the point of welding. The dispenser holding the liquid flux is connected between the acetylene regulator and the torch so that all of the acetylene gas must pass through it.

The advantage of vapor flux is that its use permits continuous welding since it is not necessary to pause from time to time to apply powdered flux to either the welding rod or welding area. The welding area, moreover, is automatically supplied with the flux required to provide the chemically clean surface necessary to insure a strong bond.

In this method of application, the amount of flux used is automatically controlled by the acetylene flow, saving both time and material. The latter saving is possible because of two reasons: (1) no more flux than that required for the welding operation can be passed and (2) all of the flux is deposited at the point where needed, making it impossible to use an excessive amount. The avoidance of excessive flux also effects important improvements in the appearance of the weld and cuts down welding time.

Whatever your metal-finishing jobs may be . . . you'll finish faster and better with SKILSAW Quality Sanding Discs. They're scientifically made of finest materials to sand *smoother* and to wear *longer!*

SKILSAW Quality Sanding Discs are made of sharp-cutting aluminum oxide bonded with heat-resisting resin to a flexible fibre back. Available in 2 sizes and in all popular grits and grades to insure peak output on every job. Write for recommended types on your sanding operations . . . or phone your distributor for SKILSAW Quality Sanding Discs *today!*

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SALES AND SERVICE BRANCHES IN ALL PRINCIPAL CITIES

ARMY E NAVY

SKILSAW PORTABLE ELECTRIC TOOLS

★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

Cold Welding

Q—Much has been made by the Office of Defense Transportation of "cold welding." What kind of welding process is this?—*J.I.B.*

A—Cold welding or "lacing" is a process that has been used for years in the repair of cylinder heads and cylinder blocks. It is used extensively to repair various parts of automotive engines which have become cracked, either because of high heat or freezing.

The process can hardly be called a welding process inasmuch as it consists primarily of drilling, tapping and screwing a pin in place to fill the hole. First the drilling is done in the end of each crack to prevent further development of the crack. The drilled hole is then tapped, and a special rod is screwed into it and cut off. Each hole is drilled and tapped at specific intervals for its entire length in such a manner that each stud is interlocked with the next one, and each stud is peened. A quantity of sealing compound is then circulated through the cooling system. As a final inspection, hot or boiling water is circulated through the cooling system, making it possible to locate any further leak which might not be visible to the naked eye.

Complete information on cold welding may be obtained from Kerkling and Company, Bloomington, Indiana.

» «

Hot and Cold Shortness

Q—What is meant by hot shortness and cold shortness? These terms are frequently used in connection with various metals.—*E. R.*

A—Hot shortness is a term used to describe a metal or alloy which is brittle or exhibits the absence of ductility at high temperatures. Some metals exhibit marked reduction in ductility in either a definite temperature zone (steel about 932 F) or generally rising temperature (alpha brass up to 1292 F). Hot shortness may develop suddenly due to the commencement of liquefaction.

Cold shortness is the opposite of hot shortness. Metal that is cold short is brittle at ordinary temperatures. Some metals may be quite ductile at elevated temperatures but become brittle upon cooling.

» «

He Doesn't Agree!

"I do not agree with the malleable cast iron brazing technique described in the September issue. My experience has been that if you use a slightly oxidizing flame the bronze will adhere more readily; also any good cast iron brazing flux should work equally as well on malleable iron and a good high-temperature brazing flux will keep your bronze from burning.

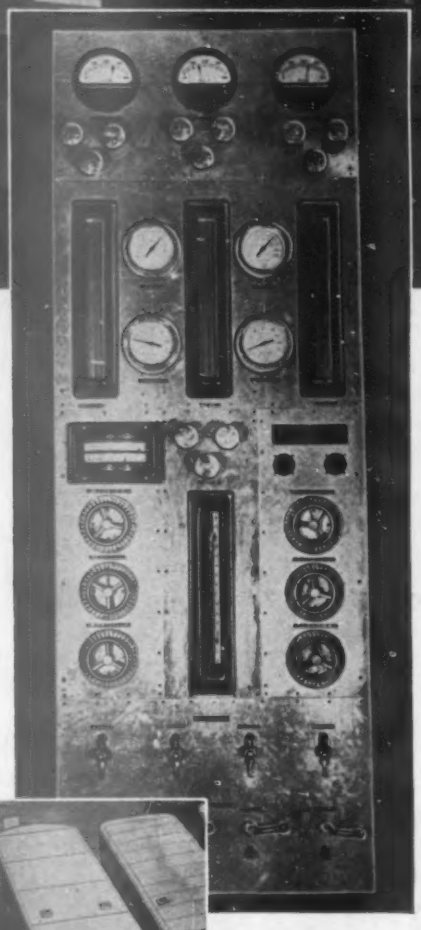
"I have found that a good cast iron brazing flux will also serve as cast iron welding flux."

J. A. Glenn, Albany, Ind.

If you, as a reader, do not agree with our answers, let us know your thoughts. Your comments and discussions will be published, too.

SCHOOL DAYS for Mechanized WARFARE

Corner of classroom at the Independent Engineering Co. plant, O'Fallon, Illinois.



ANOTHER FIRST for Independent . . . a course of specialized training for men of the armed forces in the handling of industrial gas producing equipment. In this way, the superior design and manufacturing principles of Independent Engineering is matched with highest technical skill . . . an *unbeatable* combination in the field of mechanized warfare.

When Victory is won—these trained operators, using Independent Equipment, will be able to serve you *best* in your peacetime pursuits.

Independent Engineering Co.—Pioneer designers and producers of mobile Oxygen and Hydrogen generating plants for the armed forces . . . builders of Oxygen, Hydrogen and Acetylene plants—manufacturers of industrial gas cylinders and cylinder handling equipment.

Independent Engineering Co.

101 West Second Street, O'Fallon, Illinois

News of the Industry

Welding Distributors Form New Association

In a three-day meeting held September 20-22 at the Lake Shore Club, Chicago, 35 men representing 16 welding equipment distributing organizations throughout the United States met and organized the Welding Distributor's Association. The new association was formed primarily to give distributors of welding equipment throughout the United States an opportunity to meet and discuss problems that are common to all organizations distributing welding equipment. Another group objective is to plan for the postwar future of welding distributors.

During the initial meeting, a constitution and by-laws were adopted, officers were elected and several committees appointed. The officers are: T. A. Jones, Arcway Equipment Co., Philadelphia, president; Mort Cobb, Welding Engineering Sales Corp., New York City, vice-president; W. H. Simmons, Welding Sales and Engineering Co., Detroit, secretary-treasurer. The board of directors consists of these officers and E. A. Daniels, Victor Equipment Co., San Francisco; F. B. Kohlbry, Machinery & Welder Corp., St. Louis, and C. E. Whitehead, Wessendorff, Nelms & Co., Houston.

» «

NYA Centers Will Be Used To Train Shipyard Weldors

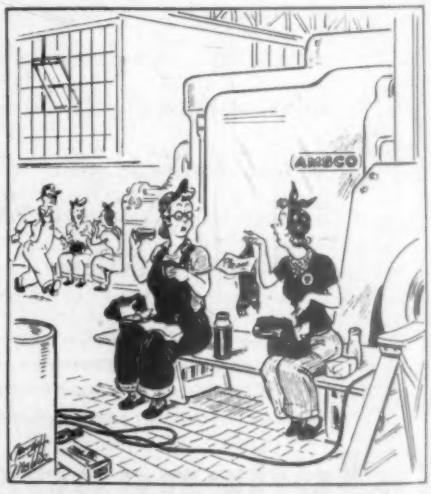
The United States Maritime Commission has acquired the Chester, Pa., training center that was formerly used by the National Youth Administration for the training of arc weldors, machinists and sheet metal workers. The Chester center is adjacent to the Sun Shipbuilding and Dry Dock Company's Chester yard and will be assigned to that company for training new workers. The center has work stations for 32 arc welding students, 23 machine shop students and 20 students in sheet metal work.

Similar NYA facilities in Brunswick, Ga., Mobile, Ala., Richmond, Calif., and Houston, Tex., are being considered by the Commission for use as additional training centers for new shipyard workers.

» «

Federal Government Needs Draftsmen for War Agencies

Over a hundred draftsmen are being sought by the U. S. Civil Service Commission for work necessary to the prosecution of the war. Draftsmen of all types are needed, particularly ship, electrical, mechanical and topographic draftsmen. Entrance salaries range from $1,752 to $3,163 a year.



Courtesy, American Manganese Steel Div.

"My husband's always putting little surprises in my lunch box. Now his socks need darning!"

How else could you do this job economically?

To weld all seams and joints of this complex weldment down hand, the weldment had to be tilted, rotated, twisted, and turned—had to be held in a score of different positions. This is easily done with a C-F Positioner, for at the push of a button it will rotate a weldment (thru 360°) or tilt it (thru 135° beyond horizontal).

Without a Positioner it would require almost constant attendance of a crane and its sling crew, with horses and plenty of floor clearance for handling.

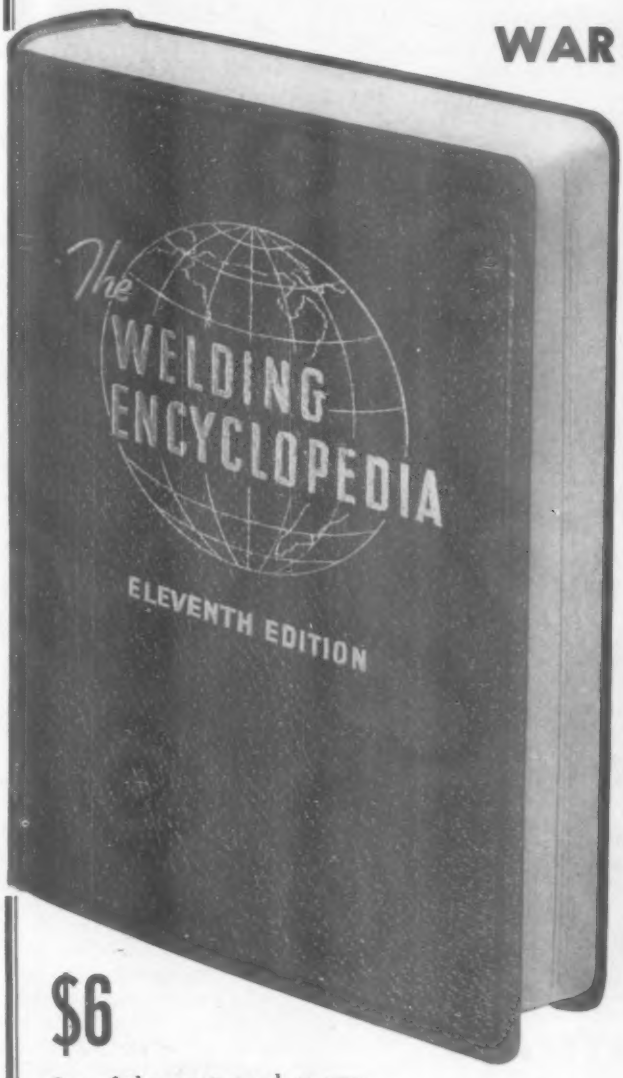
C-F Welding Positioners come in sizes and capacities up to 30,000 lbs. All are pedestal mounted and are adjustable for height.

Write for Bulletin WP-22.

CULLEN-FRIESTEDT CO. 1309 S. Kilbourn Ave., CHICAGO 23, U.S.A.

INDISPENSABLE • COMPLETE • UP-TO-DATE INFORMATION ON WELDING!

WAR WROTE THIS BOOK



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One of the greatest values ever presented by a major reference book — 976 pages of current authoritative information with 1000 illustrations on the world's most important and fast developing industrial process—Welding.

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The 11th Edition of The Welding Encyclopedia comes to you completely re-written—reflecting the tremendous changes in welding wrought by the production necessities of American Industry at war. In its 22 years of service to the Welding Industry no single edition of The Welding Encyclopedia has presented so much completely new and vital information on welding practice. Edited and written by T. B. Jefferson, leading technical editor and engineer, this complete reference book is a *must* on the list of every engineer and weldor.

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The 11th Edition is a 25% larger volume—completely rewritten. It is rearranged with easy-to-find cross-references and contains over 1000 illustrations in its 976 pages. It brings to you, in its added size, a complete compilation of exhaustive research keyed to the demands of Industry's fastest growing fabricating process. It contains compact authoritative data—much of which can be found only in The Welding Encyclopedia, 11th Edition.

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Covering more than 2000 subjects, completely indexed and cross-referenced—the 11th Edition of The Welding Encyclopedia gives up-to-the-minute complete coverage on every major phase of welding. Here are some of the important subjects presented:

Arc Welding	Metallurgy
Gas Welding	Aircraft Welding
Resistance Welding	Shipbuilding
Heliarc Welding	Automotive Welding
Atomic Hydrogen	Pipe Welding
X-Rays	Boilers & Tanks
Gamma Rays	Structural Welding
Magnetic Inspection	Training
Flame-Hardening	Eye Protection
Metallizing	Safety Practice
Heat Treatment	Railroad Equipment
Flame-Cutting	Agricultural Implements

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Be sure of getting your copy of the 11th Edition of The Welding Encyclopedia as it comes off the press in October—Order this invaluable reference book on Welding today.

Everyone in Welding Needs This Complete Welding Reference

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☐ The Welding Encyclopedia and The Welding Engineer for 1 year, a saving of $1.50 (a one year subscription to The Welding Engineer is $3.00).....$7.50

My check ( ), money order ( ) is enclosed.

NOW - NEW

THE 11th EDITION of The WELDING ENCYCLOPEDIA

Motion Picture Film Stars Safety Goggles

"Right on the Nose" is the highly appropriate title of a new sound motion picture film that was "produced" by the American Optical Co., Southbridge, Mass., in order to show in detail the quickest and easiest methods of adjusting non-prescription industrial safety goggles so that workers can wear them in comfort. The film explains through action demonstration the relatively simple steps involved in adjusting goggles to faces of different sizes and shapes.

This 16 mm, 14 minute film was made primarily for loan to safety directors, medical directors of industrial concerns, etc., who may borrow a print without charge for showing.

A booklet bearing the same title, "Right on the Nose," has been published by the company to provide in printed form the same story told in the film. Copies are available for fitters of goggles.

» «

Sellstrom Celebrates 20 Years in Business

Twentieth anniversary of the Sellstrom Mfg. Co., of Chicago, was commemorated on August 24 with a simple luncheon. After "getting together" for a one-half hour celebration, management and employees went back to work as usual.

The firm was founded in 1923 under the name of Excel Sales Co. It had originally only four employees, of whom one was G. E. Sellstrom, the active head of the business today. The company, which began in a loft over a garage, now occupies a good portion of a six-story building at 615 North Aberdeen St., Chicago. It manufactures and distributes a line of safety equipment such as goggles, helmets, shields, lenses, respirators and similar products.

» «

Mogul Buys Building for Eastern Quarters

A new building located at 135 Cedar St., New York City, has been purchased by the Metallizing Company of America, manufacturer of Mogul products, to serve as its eastern headquarters for sales and service operations. The building contains development and test laboratories, a warehouse for metallizing guns, equipment, wire, and parts, a general service department and a demonstration shop complete with all the equipment needed in a typical operating set-up for metallizing.

V. A. Cook will continue in charge of eastern operations.

» «

"Products and Priorities" Is Latest WPB Publication

A new publication designed to aid business men and Government officials in obtaining information will be issued by WPB every four weeks. The publication, titled *Products and Priorities*, will include all information formerly contained in *Priorities* and in *Product Assignments*, both of which will be discontinued.

A year's subscription of thirteen issues of the new magazine may be obtained for $2 from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. Single issues will be available at 20 cents each. Persons who now subscribe to *Priorities*, however, will receive the new publication for the balance of their regular subscription.

A feature of *Products and Priorities* is a master alphabetical index listing every product, material, or service which comes under WPB supervision or control. This will enable business men to determine easily the numbers of any applicable WPB orders and forms, all necessary CMP references, and the WPB Division and section responsible for the product, material, or service. The magazine will also include a list of Claimant Agencies, Claimant Agency program symbols and other information for which a public need is indicated.

» «

Conserve Steel, Build Wood Military Trailers

Wooden one-ton trailers for military vehicles have been designed to conserve steel and are now being produced in mass quantities by Willys-Overland Motors. The wood-bodied trailers are being turned out on the same assembly lines used to manufacture quarter-ton amphibian trailers for the company's jeeps. They can be attached to any size truck.

A POWERFUL, VERSATILE LITTLE CLAMP

This new improved Model KP 830 is now about the strongest clamp for its size on the market.

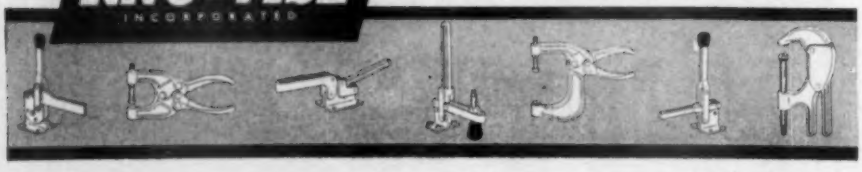
Its U-shaped bar, providing for horizontal positioning of pressure spindle, permits the clamping of many different things of various thicknesses without disturbing initial location of clamp.

Because both bar and handle are in horizontal position when clamp is closed, space above clamp is clear and offers no obstructions when performing operations which require work to be moved under drills, etc.

Clamp measures 4¾" overall, is 1⅜" high, and is capable of exerting a hand pressure of 340 lbs.

KNU-VISE INCORPORATED

1336 Plum Street, Detroit 16, Michigan
4328 San Fernando Rd, Glendale, Calif.



AS YOU NEVER DROVE BEFORE!

Many a soldier owes his life to a commander who drove him to the utmost in battle—*never let him slacken for a single fatal instant!* And after the war, many a worker will owe his economic safety to a leader who drove him continuously for higher Pay-Roll allotments for the purchase of War Bonds!

Despite higher taxes and prices, the average worker still has more money than ever before—particularly on the basis of the *family* income. With others in the family earning, too, just let the worker 'figure it out for himself', and he usually will realize that *now* he can put more into War Bonds than he has been doing.

That's why the Treasury Department has set new quotas for the current Pay-Roll Allotment Drive—*quotas running about 50% above former figures.* These quotas are designed to reach the *new* money that's coming into the family income. Coming from millions of new workers . . . from women who never worked before . . . from millions who never before earned anything like what they are getting today!

The current War Bond effort is built around the *family* unit, and the Treasury Department now urges you to organize your War Bond *thinking*—and your War Bond *selling*—on the basis of your employees' *family* incomes. For details, get in touch with your local War Finance Committee which will supply you with all necessary material for the proper presentation of the new plan to your workers through your labor-management committees.

Today about 30,000,000 wage earners, in 175,000 plants, are buying War Bonds at the rate of nearly half a billion dollars a month. Great as this sum is, *it is not enough!* So turn-to today! Get this new *family income plan working!*

This Space Is a Contribution to America's All-Out War Effort By

THE WELDING ENGINEER

Will Women Surrender War Jobs to Soldiers?

The answer to the above question is an overwhelming "yes" as revealed in a poll conducted by the *Woman's Home Companion.* This survey of women's opinion, the *Companion* emphasizes, was based on a national panel selected to provide a true cross-section of the magazine's millions of readers.

The answer to the question, "Should women relinquish their war jobs after the war?" was three to one in the affirmative. Moreover, many of the negative votes were modified by such qualifications as, "Women should not relinquish their jobs, *except* if ex-service men need these jobs."

Many of the voters amplified their opinions by such comments as:

"Definitely, returning men should get jobs; they will need them."

"Women are homemakers and mothers except in emergency; a woman's place is in the home."

"Exceptions should be made in cases of women who are self-supporting or who are left widows or whose husbands are disabled."

» «

Heat Treatment Discussed at Chicago Metal Meetings

An educational series of meetings on "Practical Heat Treatment" is being sponsored by the Chicago Chapter of the American Society for Metals. The series covers the subjects: "Why Heat Treat?", "Normalizing and Annealing," "Case Hardening," "Tool Hardening," "Distortion Control," "Selective Hardening and Tempering" and "What Are Your Heat-Treating Problems?" Under guidance of a discussion leader, the bulk of the talking is done by the audience, who are thus given the opportunity to exchange ideas and to find out how the other fellow is doing it. The meetings are being held at the American Room of the Hamilton Hotel, 20 S. Dearborn St., Chicago, at 7:30 P.M. every Tuesday evening from September 14 to November 9, inclusive. Both members and non-members are invited.

» «

A Safer War for Workers

World War II may be plenty tough for the fighting man, but it is a lot safer than World War I for the American war worker, according to the 1943 edition of *Accident Facts,* statistical yearbook of the National Safety Council.

Deaths per 100,000 workers in the current war are one to one and half times less than fatalities to war workers during 1917-18, the Council reports. Railroad workers, to cite a specific example, are twice as safe today as they were in the last war.

Of 31 war industries studied, the military aircraft manufacturing industry was among the "top five" in protecting the safety of its workers. Workers in this industry suffered only 9.53 disabling injuries per 1,000,000 man-hours worked as compared with an average of 14.85 for all 31 industries. Furthermore, the severity of accidents in the military aircraft manufacturing industry was 0.61 days lost per 1,000 man-hours as compared with the average of 1.49 for all 31 industries.

With 4,400 deaths, agriculture took the heaviest toll last year among war workers. Trades and service were next with 3,500 deaths, followed in order by construction (3,100), manufacturing (3,100), transportation and utilities (2,500), and mining, quarrying, oil and gas wells (1,900).

» «

Inventors Share Gains at Glenn L. Martin Co.

The old sad story about the poor inventor who starved while the boss waxed rich off his brain-child will never be told about an employee of the Glenn L. Martin Co. This Baltimore aircraft manufacturer has brushed aside the tradition that an employee-inventor's wage or salary constituted full payment for all of his ideas and has set up an employees' patent remuneration plan.

Under this plan, a separate agreement is entered into between the employee and the company long before the inventor's patent is applied for. The company agrees to bear the expense of patenting the invention and (where the opportunity arises) to license it to outside concerns for manufacture. The employee-inventor will receive a share of the proceeds from such licensing, starting at 10% until he has received $5,000 and according to a sliding scale thereafter.

U. S. OXY-ACETYLENE PRESSURE GAUGES

We are helping thousands of contractors for the Army and Navy to save gas by enabling the operator to use the correct pressure for every job.

U. S. GAUGE CO.
14 Wall Street
NEW YORK 5, N. Y.

the THREE *Freedoms*

1 **Freedom from large-job interruptions . . .**
How? Sight Feed's *visible* carbide supply!

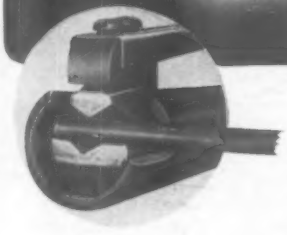
2 **Freedom from acetylene delivery delays . . .**
How? Sight Feed makes you *independent* of "bottlers"!

3 **Freedom from excessive operating costs . . .**
How? Sight Feed *cuts* acetylene costs up to 75%!

● With our Country at war for the FOUR Freedoms . . . Freedom from Want and Fear, Freedom of Speech and Worship . . . the above *three* can be yours, Mr. Welder, *for the asking.* Contact Sight Feed today for complete information.

THE SIGHT FEED GENERATOR COMPANY
Sales: Richmond, Indiana • Factory: W. Alexandria, Ohio

SUPREME
FULLY INSULATED ELECTRODE HOLDER



★ WITH "ROD ECONOMIZER" JAWS . . .

Air cooled completely — lightweight (1 Lb.) — balanced advantageously. Deoxidized copper throughout — high tension rod clamping with easy release pressure. Parts easily replaced.

Circular on Request . . . Attractive Prices . . . Order Sample Holder Now

WELDING ENGINEERING COMPANY
MILWAUKEE, WISCONSIN
MANUFACTURERS — DISTRIBUTORS
OFFICES AND AGENTS ALL OVER THE UNITED STATES

Act to Study Postwar Surplus Plant Problems

Representatives of varied lines of industry met last month in Washington for the first meeting of the new Committee on Utilization of War Plants and Surplus Property—a special business men's committee organized at the instigation of the United States Chamber of Commerce to study the postwar problem of war surplus plants and supplies.

The chairman of the new committee is Albert C. Mattei, a vice-president of the Chamber and president of the Honolulu Oil Corp., San Francisco. T. W. Howard, manager of the Chamber's Department of Manufacture, is secretary.

In a statement outlining the purposes of the new committee, the Chamber said:

"Even before military operations reach their greatest intensity, the war agencies are finding that they have excess stocks of some kinds of war material and supplies. The accumulation of such stocks is inevitable in a highly mechanized war . . . As the war goes on and comes to a close, the problem of the disposition of surplus property will become increasingly important. There will also be the problem, at the end of the war, of the proper and efficient utilization of the great special-purpose manufacturing plants."

Members of the committee include officers of companies engaged in the production of raw materials, the manufacture of war supplies, industrial machinery and transportation equipment, the building and operation of ships, the manufacture and distribution of consumer goods, and banking.

» «

OCD Establishes New National Security Award

The United States Office of Civilian Defense is establishing the "National Security Award" to recognize those industrial plants which have developed superior safeguards against fire, sabotage, accidents or possible air attack. All industrial plants and related establishments are eligible to receive this Certificate of Merit if properly qualified. Further information can be obtained from the Editorial Section, U. S. Office of Civilian Defense, Washington 25.

» «

Moves to New Address

The Welding Supply Co., Syracuse, N. Y., has moved to new and expanded quarters at 113 Larned Street, Syracuse 4.

MORE WELD PER POUND; LESS WASTE PER STICK AND GREATER CONTROL

EDCO
YELLOW SHIELDED
PHOSPHOR BRONZE
ELECTRODES

It's MORE Important NOW than ever before to CONSERVE MATERIAL. Be sure you SPECIFY EDCO.

★ *Write or wire for your nearest distributor.*

SOLE MANUFACTURER
ECCLES & DAVIES MACHINERY CO., INC.
1910 SANTA FE AVENUE • LOS ANGELES 21, CALIFORNIA
Distributors in All Principal Cities

ABOUT PEOPLE

Robert H. McCracken, for the past two years assistant general sales manager at the Harrisburg, Pa, home office of the Central Iron and Steel Co., has been appointed manager of combined sales of the Boston office of Lukens Steel Co. and subsidiaries, By-Products Steel Corp. and Lukenweld, Inc., 131 State St., Boston 9. He succeeds **Harry G. Porch,** who retired from active duty on Sept. 1 after 48 years of continuous service with Lukens.

H. G. Austin, who has been assistant manager of sales for the Lukens Boston office, has been appointed assistant manager of combined sales of Lukens, By-Products and Lukenweld.

» «

George M. Gillen, who has been in charge of advertising and sales promotion for Lukens Steel Co. since 1935, has been appointed assistant manager of combined sales of this concern and its subsidiaries, By-Products Steel Corp. and Lukenweld, Inc.

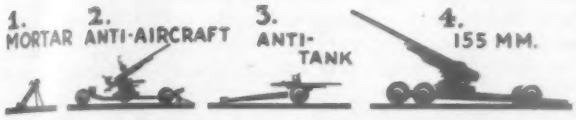
» «

Robert G. Glass, assistant manager of operations, Chicago district, Carnegie-Illinois Steel Corp., has been elected a director of the Geneva Steel Co. and vice-president and manager of operations of this new Utah subsidiary of United States Steel Corp.

» «

Carl F. Freedman, who has just completed his eleventh year as general manager of the American Agile Corp., Cleveland, has been made vice-president of this concern.

It takes ALL FOUR to win VICTORY . . .



On the FIRING LINE . . .

Sure, they all shoot shells. And they're all equally important. But each one does certain jobs better than the others can do it. That's why Uncle Sam's fighters use ALL FOUR!

And on the PRODUCTION LINE . . .

BENTLEY

Welding Positioners ARE EQUALLY IMPORTANT

MM-5

Hand Tilt
Hand Rotation

Indexing rectangular parts at constant angle of tilt

MV-5

Hand Tilt
Variable Speed Rotation

Rotating circular parts at desired welding speed for hand or automatic welding at constant angle of tilt

AM-5

Air-Actuated Hydraulic Tilt
Hand Rotation

Indexing rectangular parts and tilting from horizontal to vertical by shop compressed air

AV-5

Air-Actuated Hydraulic Tilt Variable Speed Rotation with power tilt through 90 degrees—the all-purpose machine

ALL FOUR of these Bentley Welding Positioners hold, tilt and rotate a weldment. One of them is operated by hand. One has hand tilt with variable speed power rotation. One has air-actuated hydraulic tilt and hand rotation. And one has air-actuated hydraulic tilt and variable speed power rotation. Possibly you could do all your positioning with any one type (500 lb. capacity, 6 in. above and off center of faceplate). But you could do a better job by selecting one or more of the various types adapted for certain specific jobs. FOR EACH OF THE FOUR DOES CERTAIN JOBS BETTER. And a combination of ALL FOUR will give your shop that EXTRA PUNCH which spells victory on every contract and in the face of any competition.

Write or wire for full description and prices. Prompt delivery.

BENTLEY WELDERY, Inc.
Syracuse, N. Y.

OUT IN FRONT for SHEET METAL CUTTING

Stanley Unishears reduce sheet metal cutting to a simple operation. They can follow any line that comes off the drafting board—without wasting a single ounce of metal.

With a little practice anyone—man or woman—can cut straight or curved lines, angles and complicated notches quickly, without burrs or distortion of the metal. Capacities from 18 gauge up to 10 gauge on hot rolled steel or galvanized iron. Ask your distributor for complete information. Stanley Electric Tool Division, The Stanley Works, New Britain, Connecticut.

STANLEY
Trade Mark
1843 - 1943

STANLEY UNISHEARS

THE ELECTRICALLY DRIVEN HAND SHEARS

T. H. Wickenden has been appointed manager and **H. J. French** assistant manager of the Development and Research Division of the International Nickel Co., Inc. Mr. Wickenden has been assistant manager of the division since 1931. Mr. French, who is temporarily serving in the Steel Division of WPB, has been in charge of alloy steel development in International Nickel's Development and Research Division since 1932. He was co-author of the 1940 Lincoln Award paper, "Weld Hardening of Carbon and Alloy Steels."

» «

William J. Conley, former chairman of the Engineering Department of the University of Rochester, has joined The Lincoln Electric Co., Cleveland, as consulting engineer. He will act as welding consultant for various industries, handling problems on mechanical and structural design utilizing welding and also metallurgical problems involving welding processes. Mr. Conley will also have charge of the company's welding educational activities, consisting of courses in welding engineering and design, also lectures and talks in the field before technical societies and industrial groups.

» «

Sam Tour, who has been vice-president and chemical and metallurgical engineer of Lucius Pitkin, Inc., and more recently director of the Frankford Arsenal Laboratory of the Ordnance Dept., has resigned from the latter position in order to devote his full time to the newly formed Sam Tour & Co., Inc. This concern is taking over the work formerly handled by the Pitkin company as consultants, engineers, metallurgists, metallographers, radiographers, research developers and testers in the metallurgical, chemical and process engineering fields. Headquarters will be at 65 Pine St., New York City 5.

» «

Lieutenant Colonel C. H. Greenall, formerly of the Bell Telephone Laboratories, succeeds Mr. Tour as director of the Frankford Arsenal Laboratory. **Major H. H. Stout,** formerly of Phelps Dodge Copper Co., is administrative officer for research activities.

» «

J. J. Topolinski, formerly superintendent, has been promoted to works manager of Skilsaw, Inc., Chicago. He succeeds **L. E. Parker,** who was forced to resign from the company because of the ill health of his wife.

» «

William C. Cuntz has been made district manager of the Welding Div. of Metal & Thermit Corp., with headquarters at the corporation's branch office, 1514 North Ave., West, Pittsburgh. His territory will include southern New Jersey, Pennsylvania and Ohio and all of the southeastern states including Kentucky, Tennessee and Alabama.

» «

Louis G. Vock and **James M. Wilson** have been appointed district engineers of the Thermit Dept., Metal & Thermit Corp. Mr. Vock will operate from the corporation's branch at 7300 S. Chicago Ave., Chicago, and Mr. Wilson from the branch at 1514 North Ave., West, Pittsburgh.

» «

Thomas D. Williams, formerly assistant superintendent of construction, has been appointed superintendent of construction of American Steel & Wire Co., Cleveland, U. S. Steel subsidiary. **James McCulloch,** formerly of the chief engineer's office, succeeds Mr. Williams as assistant superintendent of construction.

Died . . .

Albion James Wadhams, a vice-president of The International Nickel Co., Inc., and manager of the company's Development and Research Division, died at his summer home at Elizabethtown, N. Y., on Sunday evening, August 22, of a heart attack. He was 68 years old and had been manager of the Development and Research Division since 1922. Many of the present wide applications of nickel and its alloys were developed under his guidance.

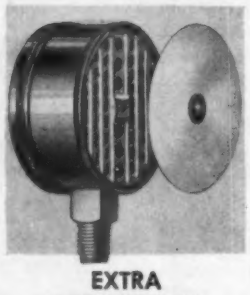
MOTO METER
PRESSURE
GAUGES

MOTO METER Pressure Gauges are designed to permit most effective and economical use of oxy-acetylene flame processes. Their sensitive pointers and clearly legible dials provide pressure facts that help to insure proper welds and clean cuts.

. . . make possible correct pressures for each operation.

. . . aid in conserving vital oxygen and acetylene gases.

Exclusive construction incorporates grid-plate safety feature shown at right. MOTO METER Pressure Gauges are listed as approved by Underwriters Laboratories.

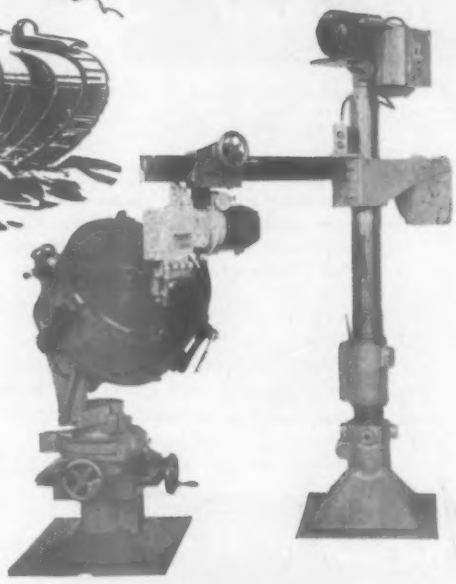


EXTRA PROTECTION

for operator and plant equipment is obtained through grid retainer plate, exclusive with MOTO METER Pressure Gauges.

THE ELECTRIC AUTO-LITE COMPANY
MOTO METER GAUGE & EQUIPMENT DIVISION
CHRYSLER BUILDING, NEW YORK, N. Y.
FACTORY LA CROSSE, WISCONSIN

Quicker Welding . . With This Automatic Welding Machine Fixture



Reloading Is done During Welding Operation

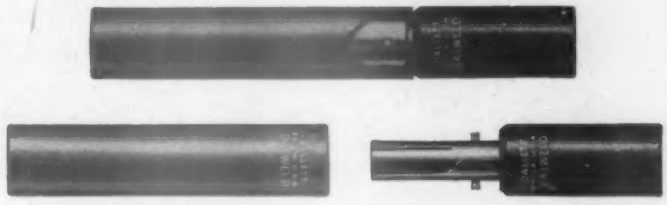
THIS Acme dual fixture arrangement permits practically constant use of an automatic welding head, because one of the fixtures can be reloaded while the other is engaged in the welding operation.

The holding machine can be set to revolve at any angle from vertical to horizontal. (Illustration shows a wheel being welded at 45° angle.) Positioner arm swings from one fixture to the other, locking in proper position. Speed of rotating the work is adjustable, as desired.

ACME *Manufacturing Co.*
1642 HOWARD ST. • DETROIT, MICH.

WRITE
for information. Whatever your positioning problem on automatic welding, let us help you solve it. Write for complete information.

"DALWELD" DETACHABLE WELDING CABLE CONNECTOR *features:*



- Constructed for rough usage
- Large area contact
- Fully insulated
- Quick acting
- Quarter-twist connects or disconnects
- Cannot accidentally be pulled apart

The "Dalweld" saves time, power and cable; standard in many small shops, and the country's largest shipyards, aircraft factories, tank shops, etc. Write for descriptive literature.

THE DALLETT COMPANY

MASCHER AT LIPPINCOTT STREET — PHILADELPHIA 33, PENNSYLVANIA

PNEUMATIC "WELD-FLUX" SCALING HAMMERS ■ "DALBO" AIR HOSE COUPLINGS

"DALLETT" PNEUMATIC SAFETY RETAINER SHANK CHISELS

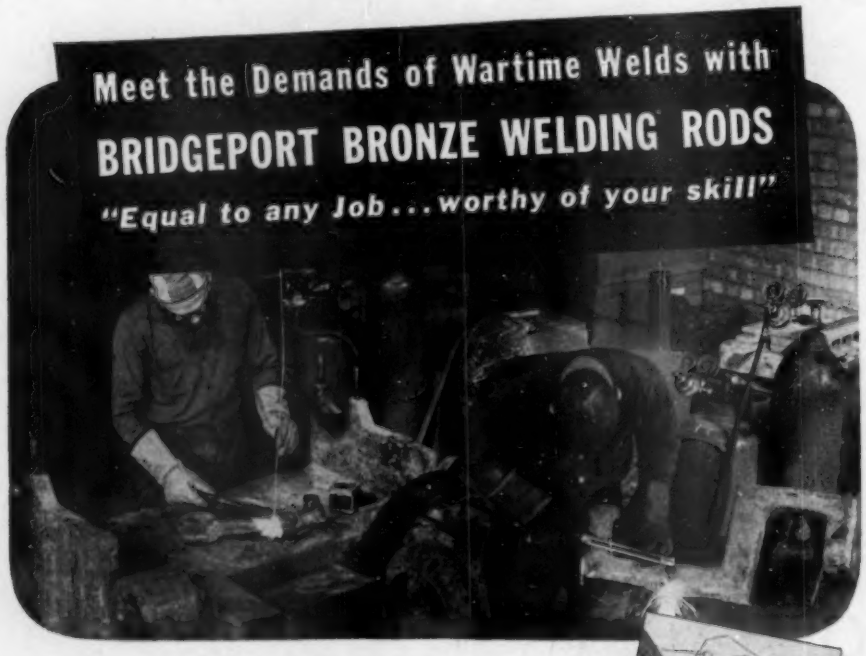
■ ■ *PNEUMATIC AND HAND CHISELS* ■ ■

Helpful Literature Just Published

The following reviews are of recent publications of interest to those in the welding industry. Unless otherwise stated, they may be obtained without cost by writing to the manufacturers listed.

Electrode Comparison Chart

A four-page, letterhead-size "Comparable Chart of Stainless Steel Electrodes" has just been published by **Alloy Rods Co.**, York, Pa. This lists the AISI classification numbers for 18 classifications of stainless steel arc welding electrodes and the trade names of the electrodes conforming to each classification. Thus it is possible to group all stainless steel electrodes of similar classification by reading across a single horizontal line. The 15 leading electrode manufacturers represented include such brand names as Arcaloy, Airco, Stain-Craft, Stainlend, Chromend, Champion, Rezistal, Harstain, Harnichrome, Hollup, Stainweld, McKay, Maurath, Murex, Allegheny, SW and Wilson. The trade names of stainless steel electrodes for armor plate welding are also listed, while the last page of the chart gives chemical analyses of the 18 types of Arcaloy electrodes.



War has written the specifications for today's welds. Now more than ever, they must be strong, dense, tough—equal to any job. Bridgeport Bronze welding rods meet these demands.

The reliable, workable qualities of Bridgeport Bronze welding rods assure a build-up worthy of your skill. Smooth, easy machinability assured.

To produce bronze welding rods to wartime standards of quality, Bridgeport draws upon the experience of 78 years in metallurgical research and development. Specify "BRIDGEPORT" next time you order welding rods from your jobber. Get the best.

FACTS for WELDERS ... Practical, up-to-the-minute data. How to select and use bronze welding rods for best results. It is yours free by writing Bridgeport.

BRIDGEPORT BRASS

"Bridgeport" BRIDGEPORT BRASS COMPANY • BRIDGEPORT, CONN. • ESTABLISHED 1865

Stored Energy Welding

A handsomely printed, 16-page letterhead-size booklet has just been published to describe the Sciaky principles of stored energy, preheating and variable pressure cycles as applied to the company's standard press-type spot welder for aluminum and aluminum alloys. Other mechanical and electrical features of Sciaky machines are also covered. Two full pages in the pamphlet are devoted to the reproduction of unretouched macrophotos of spot welds in Alclad, magnesium alloy and stainless steel and to charts of minimum shear test values. **Sciaky Brothers**, 4915 West 67th St., Chicago 38.

» «

"War-Winning Suggestions"

The above 62-page, 8 by 10½ in. booklet is fifth in a series of informative technical bulletins published by the War Production Drive. "War-Winning Suggestions" describes nearly 1,000 tested production ideas representing the best suggestions out of an estimated half million received by the WPB Board for Individual Awards. The suggestions are arranged in industrial classifications and cross-indexed by type. The industrial classifications are: automotive, aviation, chemicals and synthetics, engines, mining ordnance, radio, radar and electrical, railroads, shipbuilding, steel and foundry, textiles, miscellaneous. The cross-index reference cover such subjects as machining methods, safety, new tools and fixtures, conservation office and shop practices, work simplification, etc. Qualified representatives of war plants may secure this bulletin from **War Production Drive Headquarters**, New Municipal Center Bldg., Washington 25, D. C.

» «

Spot Welder Booklet

The full Eisler line of light bench-type spot welders ranging from ¼ to 3 kva is described and pictured in Bulletin No. 93-W-43 of the **Eisler Engineering Co.**, 740-770 South 13th St., Newark 3, N. J. Widely used in the manufacture of radio tubes, incandescent lamps, optical goods, jewelry, wire work, etc., these small spot welding machines are offered in the rocker arm or plunger press styles and in the newly devised vertical foot-operated "precision" spot welder units. Auxiliary equipment such as special welding tips and fixtures, automatic welding timers and contactors, transformers, etc. is also covered in this 28-page catalog.

» «

Positioner Bulletin

Bulletin No. 133 is a four-page, letterhead-size folder describing the Lyon hydraulic portable elevating table—a product which elevates or revolves work to convenient positions for the most efficient welding. Table measures 30 by 30 in. and has a capacity of 1 ton. **Lyon-Raymond Corp.**, 1339 Madison St., Greene, N. Y.

ANNOUNCING

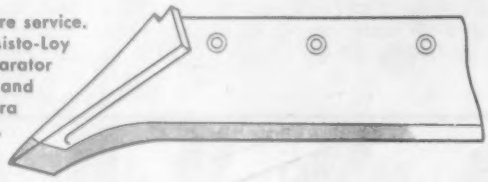
RESISTO-LOY "AG"

("AG" meaning Agricultural)

A Specially Designed Hard Facing Metal For All Agricultural Purposes

Approved By War Production Board and Conforms to W.P.B. Limitation Order L-223. Available on Priority of AA4 or Better. Apply to your local WPB office for forms.

Hard enough to resist the most severe service. Tough too—will not chip. Apply Resisto-Loy "AG" to plow points and shares, separator cylinder teeth, disc plows and harrows, and feed mill hammers. See how much extra service a good hard facing will give you. Available in both oxy-acetylene and electric arc types for AC or DC machines.

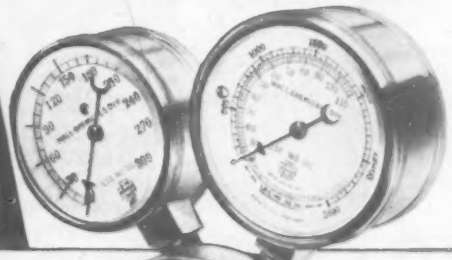


Write the following distributors:

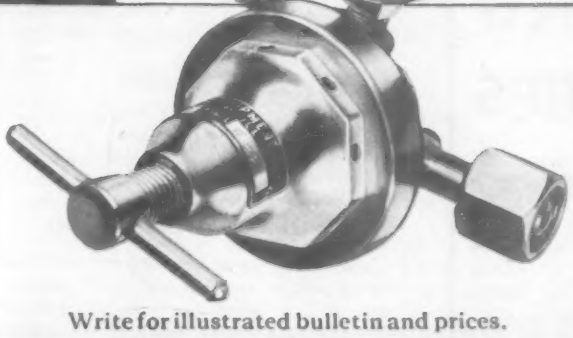
CALIFORNIA—Yonkers & Johnson, SO. DOS PALOS
FLORIDA—Welding Engineering Co., MIAMI
INDIANA—Purity Cylinder Gases, Inc., WARSAW
KANSAS—R. T. Brown Co., Ltd., SALINA
KANSAS—J. A. Richardson Mfg. Co., CAWTER CITY
LOUISIANA—Woodward, Wight & Co., NEW ORLEANS
MAINE—Brown-Wales Co., LEWISTON
MARYLAND—Southern Oxygen Co., HYATTSVILLE and BALTIMORE
MASSACHUSETTS—Brown-Wales Co., BOSTON
MICHIGAN—Welding Metals & Mfg. Co., DETROIT
MICHIGAN—Purity Cylinder Gases, Inc., GRAND RAPIDS, KALAMAZOO and LANSING
MISSISSIPPI—J. E. Dilworth Co., VICKSBURG
MISSOURI—Puritan Compressed Gas Corp., KANSAS CITY
MISSOURI—Ross-Frazer Iron Co., ST. JOSEPH
OHIO—Universal Power Co., CLEVELAND
OKLAHOMA—Big Three Welding Equipment Co., TULSA and OKLAHOMA CITY
OREGON—Industrial Air Products Corp., PORTLAND
PENNSYLVANIA—Arcway Equipment Co., PHILADELPHIA and PITTSBURGH
PENNSYLVANIA—Shop Supply Co., PITTSBURGH
TENNESSEE—J. E. Dilworth Co., MEMPHIS
TENNESSEE—Southern Oxygen Co., KINGSPORT
TEXAS—Big Three Welding Equipment Co., FORT WORTH, HOUSTON, EL PASO, SAN ANTONIO and AMARILLO
TEXAS—Corpus Christi Oxygen Co., CORPUS CHRISTI and McALLEN
VIRGINIA—Southern Oxygen Co., RICHMOND
WASHINGTON, D. C.—Southern Oxygen Co.

Resisto-Loy COMPANY
GRAND RAPIDS, MICHIGAN

DEPENDABLE



Gasweld Pressure Regulators



Write for illustrated bulletin and prices.

Gasweld Pressure Regulators have many exclusive design and construction advantages. Precision-built . . . capable of remarkably fine adjustment . . . they assure an ample supply of gas at a constant, even pressure. A new type of "soft floating seat," which works WITH—not against—the pressure, handles either a large or very small gas flow without excessive gauge drop. Models are available for the heaviest cutting and for the lightest welding jobs. Made for use with Oxygen, Acetylene, and Hydrogen; or Propane and other Petroleum fuel gases.

Buffalo, N. Y.
Cincinnati, O.
Chicago, Ill.
Detroit, Mich.
Louisville, Ky.
Milwaukee, Wis.

WALL CHEMICALS DIVISION of
The Liquid Carbonic Corporation
3110 S. Kedzie Ave., Chicago, Ill.

Rochester, N. Y.
Toledo, Ohio
Canada:
Montreal, Quebec
Toronto, Ontario
Windsor, Ontario

Brightboy Catalog

An 8½ by 11 in. catalog of "Brightboy" rubber cushioned abrasive products has been published by the **Brightboy Industrial Div. of Weldon Roberts Rubber Co.**, Newark 7, N. J. This discusses time and production short cuts in deburring, finishing and polishing, presents a table of machine speeds covering the use of Brightboy wheels, and describes wheels, rods, sticks, tablets and special shapes used in manual operations. The scope and purpose of two new textures—"Fine-Tex" for work on softer metals and "Tuff-Tex" for rougher finishing and work on hard metals—are also explained.

New Data on Radiography

Hitherto the use of radium for the radiography of steel and bronze has been limited to sections of 1 in. or more in thickness, owing to lack of sensitivity at thicknesses of less than 1 in. with the screen-type film usually recommended for radium radiography. The National Research Council of Canada felt that the usefulness of radium in the examination of welds could be greatly extended by using the new high contrast, fine grain films now available. The experiments sponsored by this organization are described in a 40-page, 7 by 8¼ in. pamphlet written by E. M. Nodwell and A. Morrison of the Council's division of physics and electrical engineering. A penetrameter sensitivity of 2% was found in an examination of welded pressure vessels with walls from ½ to 1 in. thick. Though admitting that X-rays are still preferable in the radiography of thin sections of steel, the authors contend that it is now possible to employ radium radiography successfully in cases where no X-ray machine is available or where the position of the area to be examined is such that X-rays cannot be used. A copy of this pamphlet, N.R.C. No. 1134, may be obtained for 50 cents from the **National Research Council**, Ottawa, Canada.

» «

Booklet on Renegotiation

In the belief that the procedure followed in renegotiating war contracts is contrary to the national interest during either war or peace, the **National Machine Tool Builders' Association** has prepared a pamphlet discussing this subject as it relates to the machine tool industry. Those interested may secure a copy of this 24-page, 6 by 9 in. publication by addressing the Association at 10525 Carnegie Ave., Cleveland 6.

» «

"Deduct-O-Graph"

This is a new automatic device designed to show payroll tax deductions in an instant's time. After proper settings have been made as to the employee's marital status, wage range and pay period, the correct amount to be deducted is then read in a window without need for any calculation or consultation of tables. The "Deduct-O-Graph" will be given without charge to any firm requesting it on a business letterhead. **George S. May Co.**, May Building, 2600 North Shore Ave., Chicago.

» «

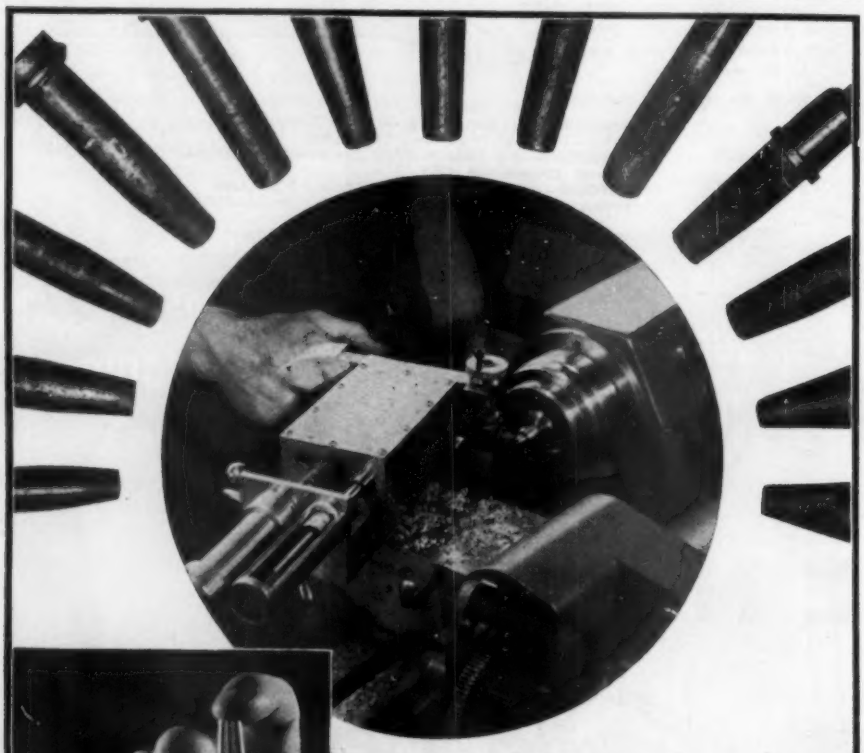
"Motor Buying Data"

This 180-page book from Westinghouse covers popular types and ratings of motors up to 100 hp, gearmotors and M-G sets. A supplementary 276-page catalog, "Control Buying Data," lists a wide variety of controls and accessories for D-C, single-phase, squirrel cage and wound rotor motors. These books may be secured only from the various Westinghouse district offices—no mailings of them will be made from Westinghouse headquarters at East Pittsburgh.

» «

Safety Booklet for Women

A new 12-page booklet entitled "Safety Regulations for Women in Industry" is being distributed by General Electric to women employees working on machines and on men's jobs. Seventeen general safety pointers are given, including the correct methods of lifting loads, use of hand tools, what to do in case of injury, how to wear approved safety clothing, goggles, face shields, etc. Single copies of this booklet may be obtained by writing for publication GEQ-217. **General Electric Co.**, Schenectady, N. Y.



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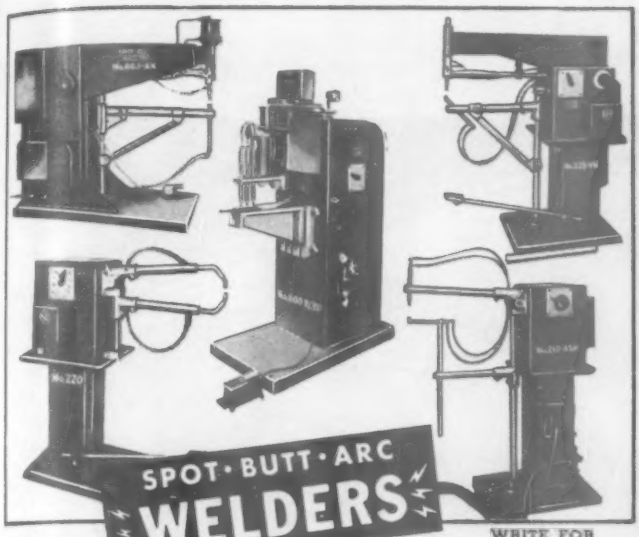

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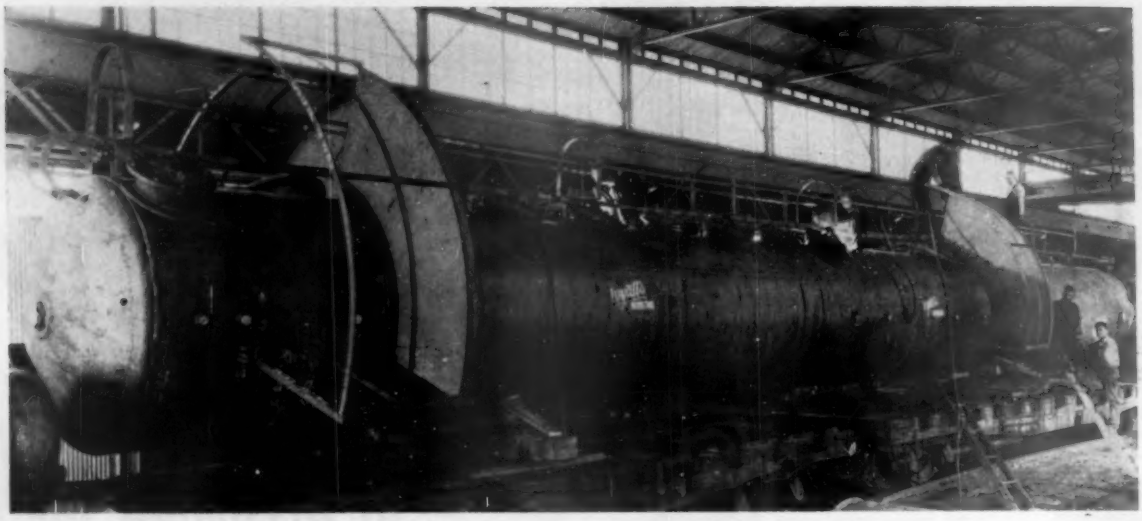


A 90 ft welded bubble tower of stainless-clad construction.

Stainless-Clad Bubble Tower*

Welding makes it possible to build corrosion-proof refining equipment. Since corrosion is a serious problem in the petroleum industry, welding undoubtedly helps to reduce costs.

THE Petroleum Industry was one of the first major industries to recognize the value of welding and to take full advantage of the vast possibilities offered by a liberal use of welding in repair and manufacturing. Knowledge gained from long experience with welding undoubtedly was of prime importance in the development of modern refinery equipment, the greater part of which could not be built by any other method.

High Temperature Vessels

An outstanding example of all-welded construction in refineries is the heavy vessels necessary for the handling of oils at high temperature (500 to 1000 F) and pressures of 1000 lbs. and more. These vessels are often 3½ in. thick and are usually carbon-molybdenum or chromium steel. The range of temperatures undergone by these vessels and the connecting pipes would make any method of construction other than welding highly impractical.

In recent years, the processing of crude oils has become more and more complicated. The rate of erosion and corrosion on vessels used in cracking sour crudes has increased to the point where alloys highly resistant to such attacks must be used. In many cases, mild steel, even though extra heavy, will barely last for 3,000 hrs. of operation. Consequently stainless steel, either the 18-8 or 25-20 variety, and Monel are widely used.

Lining with Alloy Strips

The desired alloy clad steels cannot be obtained in many cases—this is especially true when chromium alloys are to be used. The practice is to line the vessel with strips of the desired alloy six or eight inches wide and twelve to twenty-four inches long, welding the edges of the alloyed strips directly to the mild steel shell.

This method of lining has been very satisfactory except in a few instances of recent date where some difficulty has occurred from the accumulation of moisture between the alloyed lining and the steel shell. The moisture accumulates while the vessel is cold; and when the temperature is raised to a high point, the steam thus generated bursts through the thin lining. This, of course, is no reason for worry where the temperature range is small or excessively high temperatures are not encountered.

The expansion in the use of high octane gasolines by our air force in the past year has centered the attention of our major refineries on the improvement production methods. These improvements are necessitating the construction of many new and more complicated units—retooling as it were.

One large Texas refinery recently completed a 25 ft. by 90 ft. bubble tower which is a part of a unit of four towers. The bubble tower is an important part of the refining unit. In this tower, the crude oil is separated into individual components by vaporization and condensation. Most crudes contain hydrogen sulfide which causes excessive corrosion on ordinary steels where the operating temperature exceeds 400 F.

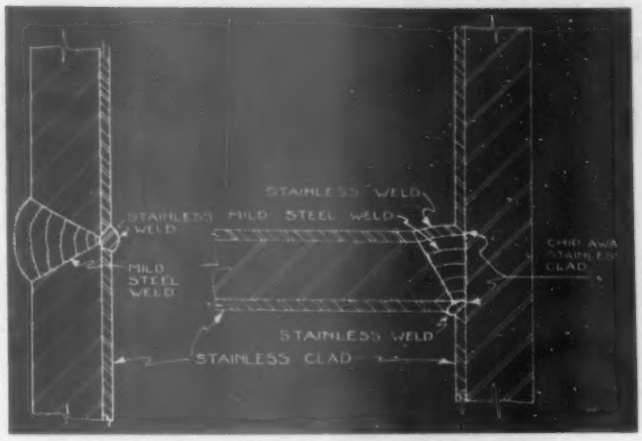
Spot Welding Used, Too

In the construction of this particular tower, 25-30 stainless steel lining was used. The outer shell is fire box quality steel, and the alloyed lining is fused to the shell by spot welding (a patented process). All seams were single vee butt welded—the shell be-

*Prize winner in Hobart Arc Welding News Contest.

ing welded first from the outside, then the root of the weld chipped out from the inside and two passes made with stainless steel rod, which sealed off all parts of the outer shell from the corrosive elements within.

It is estimated that, despite all the efforts of the petroleum industry, erosion and corrosion add about one cent to the cost of each gallon of gasoline. If it were not for welding and the methods of construction made possible by welding, the cost of all our petroleum products would certainly be much greater — in some cases probably prohibitive.



Weld joints in clad steel must be such as to provide a continuous corrosion-resistant surface. The methods by which this is accomplished for butt joints (left) and T-joints (right) are depicted in this diagram.

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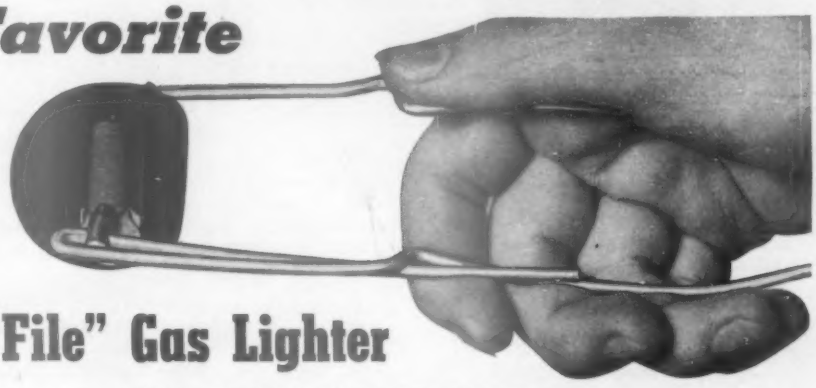

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FROM THE PATENT OFFICE

Magnesium Flux

2,327,065. **Hans A. Reimers,** Midland, assigned to **The Dow Chemical Co.,** Midland, Mich. Filed Aug. 30, 1941. Issued Aug. 17, 1943.

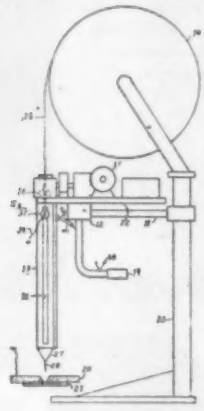
A flux to be maintained as a protective coating over the molten metal during the welding of magnesium-base alloys. Flux consists of *(a)* a mixture of calcium chloride with at least one member of the group consisting of sodium chloride and potassium chloride and *(b)* a fluoride in a proportion representing between about 0.5% and 10% by weight of the total composition. The ingredients of the chloride mixture are present in such relative proportions that the mixture has a melting point less than 650 C (1,202 F). The flux is substantially free of heavy-metal salts.

» «

Automatic Arc Welder

2,327,929. **James B. Quigley,** Hammond, Ind., assigned to **Graver Tank & Mfg. Co., Inc.** Filed Aug. 21, 1942. Issued Aug. 24, 1943.

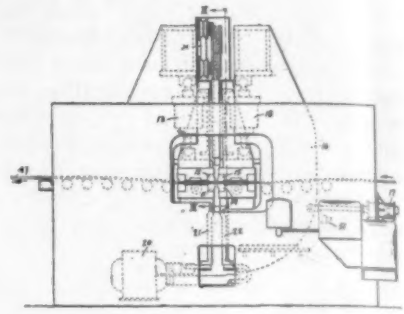
An automatic welding machine for feeding a continuous coated electrode to a tubular electrode holder. Holder has a longitudinal slot in its tubular wall; a member slidably disposed within the holder is adapted to surround the electrode received from the feeding means;



a contactor extends through the aforementioned slot in holder wall and into the slidable member. An electrical binding post is attached to contactor on the outside of the holder, and contactor is caused to engage and disengage the electrode. A portion of the contact within the slidable member is adapted to pass through the elecrode coating upon engaging the electrode.

Flash Welding Apparatus

2,328,784. **Clyde E. Coates** and Joseph **H. Cooper,** Warren, assigned to Taylor-**Winfield Corp.,** Warren, O. Filed Feb. 15, 1941. Issued Sept. 7, 1943.



An electric flash welding apparatus for welding sections of sheet into one continuous piece. The pieces of sheet are gripped and current is conducted into them; the gripping means are then moved towards each other to flash weld sheets together. A gas cutting torch mounted on a movable support is employed to trim the projecting edge of each metal piece while it is held in the gripping means preparatory to welding. The surface of the trimmed edge is of undulating character to facilitate the start of the flashing and upsetting in the welding process.

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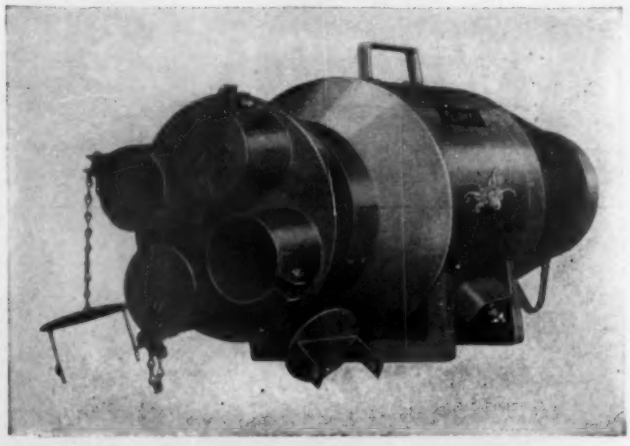

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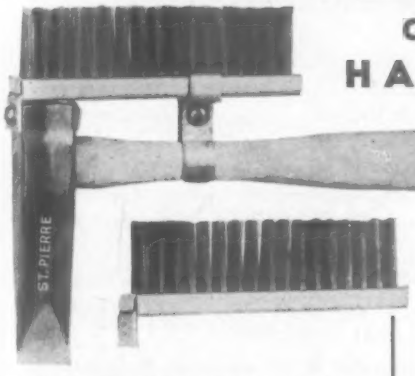

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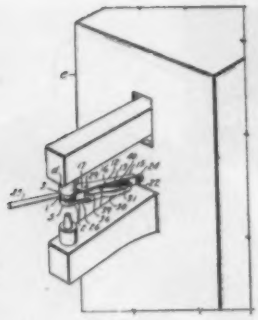

Electrode Tip Remover

2,328,433. **Rex H. Dyer,** Kansas City, Mo., assigned one-half to **Harry Allshouse.** Filed March 15, 1941. Issued Aug. 31, 1943.

A tool for removing the tip from a spot welding electrode. Elements are: jaws having gripping faces arranged to grip the tip circumferentially, a lever arm extending from one jaw and laterally with respect to the axis of the tip, an arm extending from the other jaw alongside the lever arm, connecting means hinging the two arms on an axis parallel to the axis of the tip. A jack means is fixed to one of the jaws to engage the holder when the tool is moved axially over the end of the tip; by actuating the jack, an axial pressure may be exerted between the jaws and the holder to effect withdrawal of the tip from the latter.

Submerged Melt Welding

2,326,865. **Harry E. Kennedy,** Berkeley, Calif., assigned to **The Linde Air Products Co.** Filed Sept. 26, 1941. Issued Aug. 17, 1943.

This patent pertains to an improved method of starting a weld in an electric welding process in which metal from a bare electrode is melted under a blanket of pulverized mineral-like welding composition by passing an electric current through the electrode, work piece and a molten subsurface pool of the welding composition (in which pool an end of the electrode is buried). The improved method consists of the insertion between the electrode and work piece of an unfused but electrically conductive mixture of pulverized metal and pulverized nonconductive mineral-like welding composition.

» «

Toggle C-Clamp

2,325,613. **Otis M. Kirlin,** Detroit. Filed March 5, 1941. Issued Aug. 3, 1943.

This clamp has a C-shaped frame, the inner end of which terminates in a fixed work-engaging jaw while the outer end is provided with an opening. A rack bar is freely slidable through the opening, and the second work-engaging jaw is mounted on the inner end of this slidable bar. A locking dog, formed on the inner end of an arm adjacent the outer end portion of the frame, effects locking engagement with the teeth of the rack bar, holding the latter and its jaw against sliding movement in one direction.

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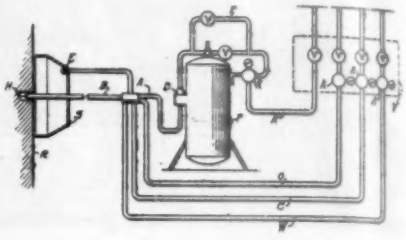

Mineral Cutting Method

2,327,482. **Robert B. Aitchison,** Grasmere, Staten Island, **Charles W. Swartout** and **Virgil C. Williams,** Kenmore, N. Y., assigned to **The Linde Air Products Co.** Filed April 18, 1939. Issued Aug. 24, 1943.

A method of piercing or otherwise cutting mineral and mineral-like masses by means of the oxy-acetylene or other oxy-fuel flame. The method comprises: (1) continuous application of a high-temperature flame at a localized heating zone on the mass in order to separate a portion of the material at the heated zone, (2) prompt removal of the separated portion from the region adjacent the flame, (3) advancement of the flame in the direction of the cut and (4) moistening the separated material after its removal from the flame region.

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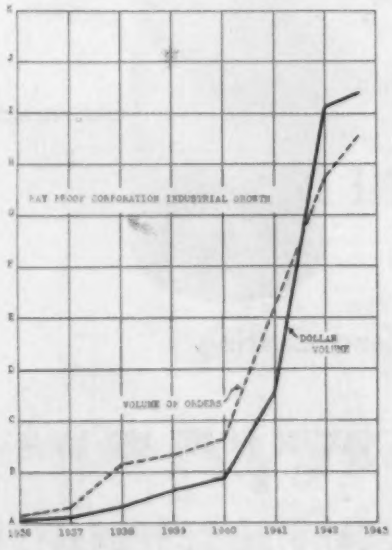

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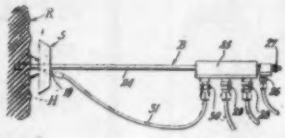
Rock Piercing Torch

2,327,483. **Robert B. Aitchison,** Grasmere, Staten Island, and **Charles J. Burch,** Kenmore, N. Y., assigned to **The Linde Air Products Co.** Filed June 13, 1940. Issued Aug. 24, 1943.



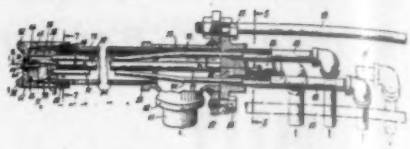
A water-cooled torch for piercing holes in rock and the like. A shield having an open front end is slidably mounted on the torch; spray nozzles associated with the shield are arranged to discharge overlapping sprays of water against the surface of the rock surrounding the mouth of the hole that is being made by the torch flame. This spraying lays the dust discharged from the hole during a piercing operation. Water that has been used to cool the torch is afterwards supplied to the spray nozzles through a flexible conduit leading from the water outlet of the torch.

» «

Mineral Cutting Torch

2,327,498. **Charles J. Burch,** Kenmore, N. Y., assigned to **The Linde Air Products Co.** Filed April 18, 1941. Issued August 24, 1943.

This patent covers a torch having a



front body, a rear body and a first member secured to both bodies and holding them in longitudinally spaced relation to one another. One or more additional members also connect the bodies, these additional members being secured to the front body and engaging the rear body for longitudinal movement relatively to the latter.

» «

Mineral Cutting Torch

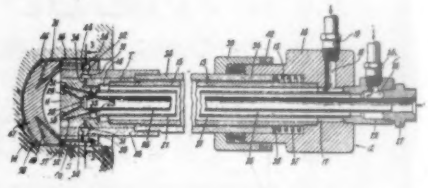
2,327,499. **Charles J. Burch,** Kenmore, N. Y. assigned to **The Linde Air Products Co.** Filed April 18, 1941. Issued Aug. 24, 1943.

A torch with a front body having gas-passage means and also coolant-passage means therethrough. A removable tip engaged over the front body communicates with the gas-passage means and is adapted to discharge gas to provide a flame. Tip carries at least one scraper member having a passage therein establishing communication with the coolant-passage means in the torch body.

» «

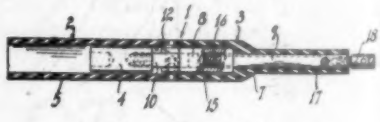
Mineral Cutting Torch

2,327,508. **James R. Craig,** Ben Avon, Pa., assigned to **The Linde Air Products Co.** Filed Jan. 7, 1942. Issued Aug. 24, 1943.



A torch suitable for piercing a hole in a rock or the like. Torch comprises an elongated tubular member having front and rear ends, means to provide a flame in advance of front end and means associated with the tubular member for scraping the forward face of the hole as piercing progresses. The scraping means is rotatable with respect to the tubular member.

» «



Electrode Holder

2,325,926. **Joseph P. Weed,** Hawthorne, Calif. Filed March 30, 1942. Issued Aug. 3, 1943.

An electrode holder comprising a handle and a tip portion. The latter is bored to receive the electrode and pivotally attached to the handle. A plunger rod within the tip is urged by cam means to engage the welding electrode.

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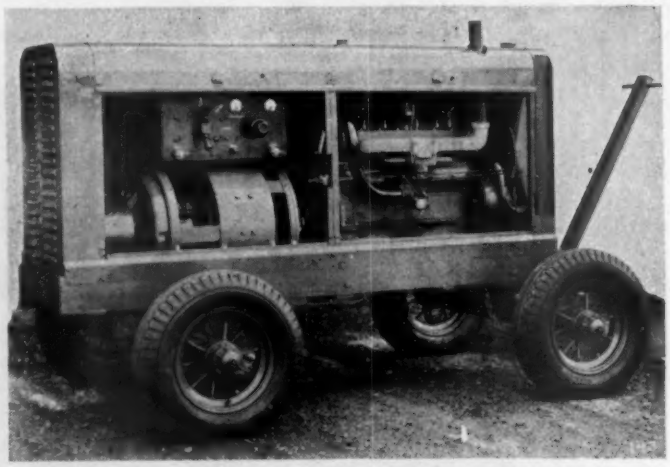

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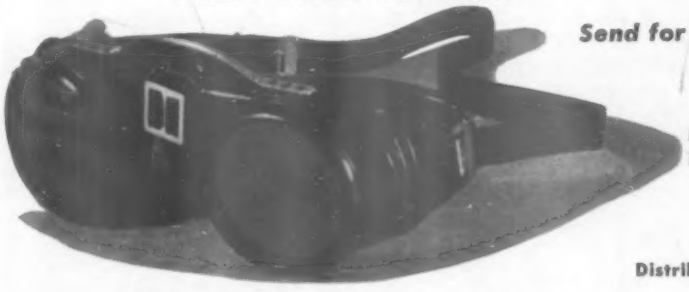

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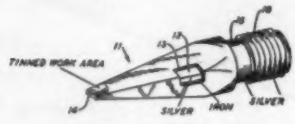
Multiphase Welding Circuit

2,329,122. **Chester Franklin Leathers** and **Gustav E. Undy**, Detroit, assigned to **Progressive Welder Co.**, Detroit. Filed Jan. 17, 1941. Issued Sept. 7, 1943.

This patent pertains to a system for supplying current to a work circuit from a multiphase A-C supply source. The primary windings of a multiphase transformer are connected to the several phases of the supply source. One of the windings is reversely connected so as to reduce the time displacement between currents flowing in the several secondary windings. A rectifier is connected in series with each secondary winding. The rectifiers are connected in parallel relation to each other and in series relation to the primary winding of a single phase transformer having a secondary winding coupled to the work circuit. A means is provided for successively rendering the rectifiers conductive throughout fractional-cycles of like polarity which overlap in time. Thus there is delivered to the work circuit current impulses which represent the summation of currents flowing in the several phases.



Soldering Iron Tip

2,324,802. **Raymond E. Powell**, Westfield, N. J., assigned to **Western Electric Co., Inc.**, New York City. Filed Oct. 5, 1940. Issued July 20, 1943.

A detachable tip for soldering irons, comprising body and attaching portions. Both portions are composed essentially of silver, with a protective armor of harder metal on the working surfaces of the body portion.

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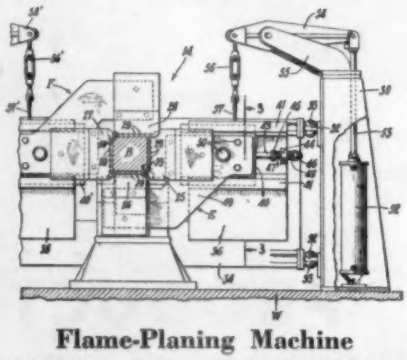
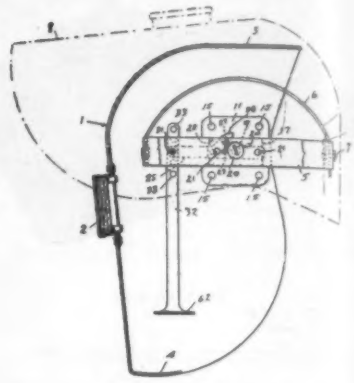


Flame-Planing Machine

2,325,106. **James H. Bucknam**, Cranford, N. J., assigned to **The Linde Air Products Co.** Filed Nov. 15, 1941. Issued July 27, 1943.

A machine for flame-conditioning the surface of a metal body while the latter is being propelled along a path in the direction of its length. There are two surface-conditioning units, each being constructed to condition at least two adjacent longitudinal surfaces of the body; these units are supported in an oppositely disposed relationship adjacent the metal body. At least one unit may be moved transversely toward and away from the path in order to vary its transverse position in accordance with the size of the body being conditioned.

» «



Weldor's Hood

2,326,376. **Frederic H. Markgraf, Jr.**, and **Joseph M. Fay**, San Francisco, assigned one-third to **Ronald Muller**, San Francisco. Filed Feb. 17, 1943. Issued Aug. 10, 1943.

A weldor's hood pivotally supported on a head-fitting member and capable of swinging from face-covering position to an elevated position over the head of the wearer. In face-covering position, the hood is releasably locked to the head-fitting member but is movable to a release position, in which it swings automatically to the elevated position.

» «

Multiple Spot Welder

2,325,291. **William A. Weightman**, Philadelphia, assigned to **Edward G. Budd Mfg. Co.**, Philadelphia. Filed Dec. 7, 1940. Issued July 27, 1943.

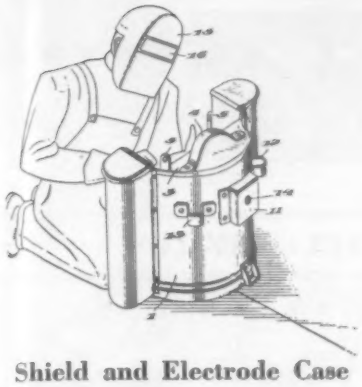
In this multiple welding apparatus, the work is held in operative position on a support on which pairs of mating electrodes are mounted. The first pair of electrodes may be transposed between inoperative and operative positions along a predetermined path of movement. A second pair of mating electrodes may likewise be transposed between inoperative and operative positions but along a different path of movement than the first. The operative positions are such as to prevent simultaneous placement of both pairs of electrodes.

» «

Spot Welding Apparatus

2,326,590. **William A. Weightman**, Philadelphia, assigned to **Edward G. Budd Mfg. Co.**, Philadelphia. Filed May 5, 1939. Issued Aug. 10, 1943.

This patent covers a fluid-pressure device for moving at least one of a pair of welding electrodes, a stationary support carrying a pair of insulated conductors, electrical connections from each conductor to an electrode, at least one connection adapted for relative movement between the respective electrode and conductor. The last-mentioned connection includes a series switch having fixed and movable contacts; an expansible member is adapted to force the movable contact into yieldable engagement with the fixed contact.



Shield and Electrode Case

2,325,506. **Harold S. Grace,** New Orleans. Filed May 14, 1943. Issued July 27, 1943.

A combined shield and electrode-container unit for weldors, comprising a base member and two housing elements. Base member has a closed front and sides, a partially closed top, and open bottom and rear. A housing element is secured to each side of the base, adjacent the open rear, to provide the outer and bottom walls of an electrode compartment. The inner walls of these compartments are formed by the adjacent side portions of the base.

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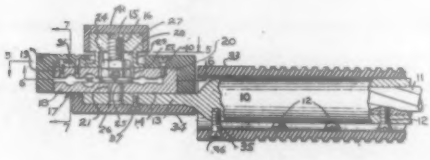

Electrode Holder

2,324,924. **Harvey H. Hall,** Denver, Colo. Filed Feb. 13, 1943. Issued July 20, 1943.

This electrode holder has a handle with a friction surface and a clamping head. The latter is rotatably connected with the handle by means of a pivot pin projecting from the friction surface. One of the two jaws of the clamping head may be urged against the handle's friction surface with sufficient force to resist accidental rotation. The patent covers the means for holding the jaws in spaced relation, means for holding the jaws in alignment, and means for simultaneously urging one jaw towards the other and towards the friction surface.

» «

Butt Welding Apparatus

2,325,000. **Max O. Kuhn,** Cuyahoga Falls, O., assigned to **The Firestone Tire & Rubber Co.,** Akron O. Filed June 20, 1940. Issued July 20, 1943.

In this electric butt welding apparatus are several pairs of electrodes adapted to grip the work-units to be united. Insulation is locally disposed between one electrode of each pair and the work-units in order to impede the direct passage of current therebetween. A rigid metallic wear-plate of high-heat resistance characteristics overlies the insulation, this wear-plate being insulated and spaced apart from the rest of the assembly.

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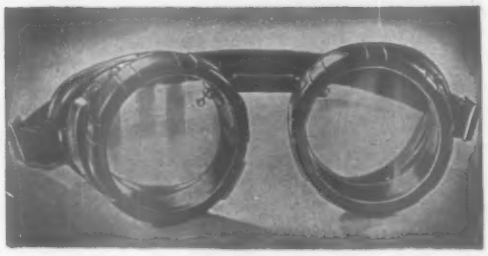

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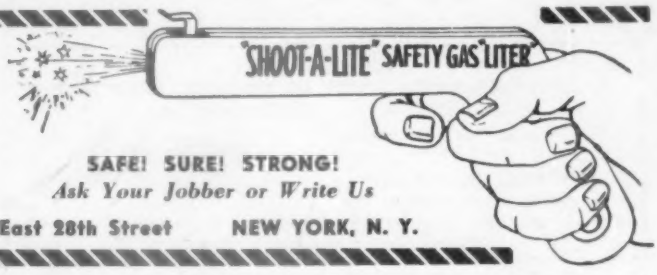

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